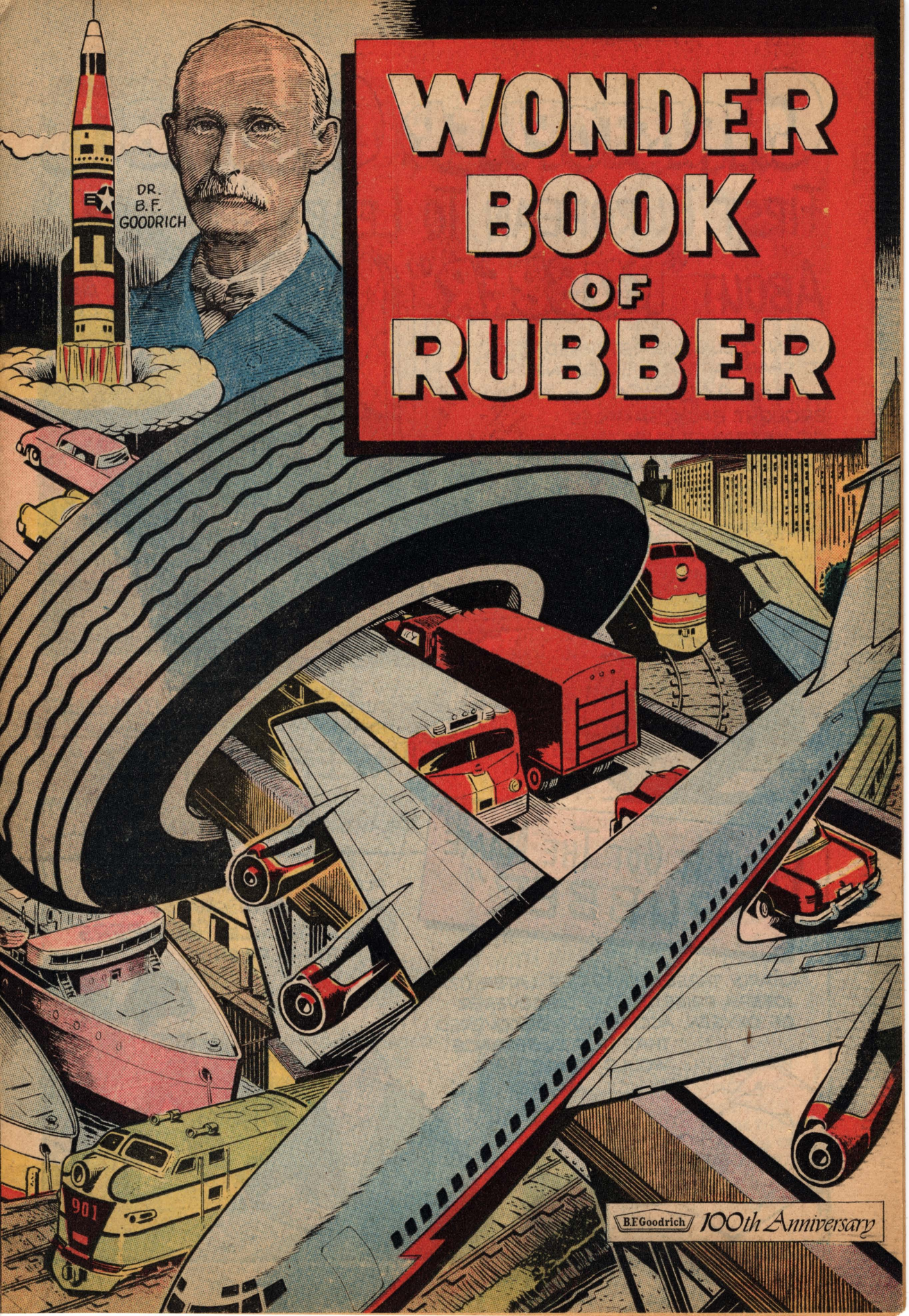

DR.
B.F.
GOODRICH
WONDER
BOOK
OF
RUBBER
901
B.F.Goodrich 100th Anniversary

CHRISTOPHER COLUMBUS

FIRST EUROPEAN TO LEARN ABOUT "RUBBER"

WHEN COLUMBUS RETURNED TO SPAIN AFTER HIS SECOND VISIT TO *AMERICA*, HE BROUGHT BACK SAMPLES OF A STRANGE SUBSTANCE THAT *BOUNCED*, AND TOLD HOW THE INDIANS PLAYED WITH A BALL MADE FROM THIS GUM OF A TREE.

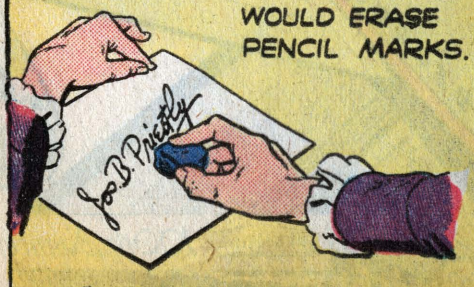
THE SUBSTANCE WAS CALLED "CAOUTCHOUC" BY THE INDIANS. TRANSLATED IT MEANS.....

"WEEPING TREE"

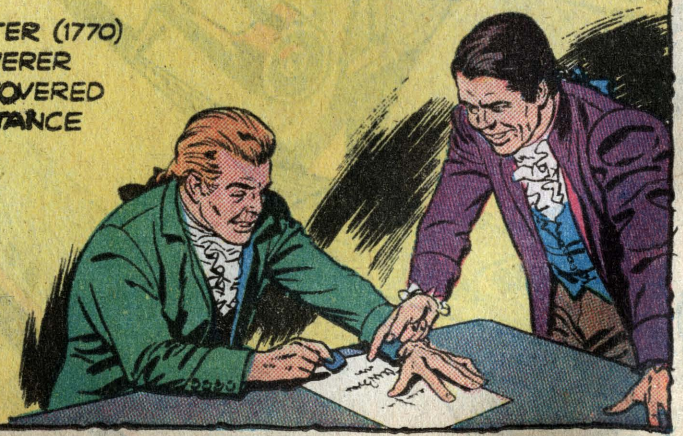
LATER THE INDIANS CALLED THIS NEW PLAYTHING "*BATOS*" MEANING BALL.

HOW IT GOT THE NAME "RUBBER"

NEARLY THREE CENTURIES LATER (1770) JOSEPH PRIESTLY, THE DISCOVERER OF OXYGEN, ACCIDENTLY DISCOVERED THAT THIS SUBSTANCE WOULD ERASE PENCIL MARKS.



PLEASED WITH THIS DISCOVERY, PRIESTLY GAVE SMALL PIECES, WHICH HE CALLED "*RUBBERS*" TO HIS FRIENDS.



WATERPROOF SHOES

WERE ONE OF THE FIRST USEFUL ARTICLES MADE OF RUBBER

IN 1736, THE *FRENCH ACADEMY OF SCIENCE* SENT A MAN TO SOUTH AMERICA TO FIND OUT MORE ABOUT THIS NEW MATERIAL, "RUBBER."

HE REPORTED THAT THE NATIVES MADE CRUDE ARTICLES, ESPECIALLY SHOES, BY POURING LIQUID RUBBER OVER MOLDS AND DRYING IT OVER THE FIRE. LAYERS WERE ADDED TO OBTAIN THE DESIRED THICKNESS.

THE FIRST RUBBER SHOES BECAME **STICKY** IN HOT WEATHER, **BRITTLE** WHEN COLD.

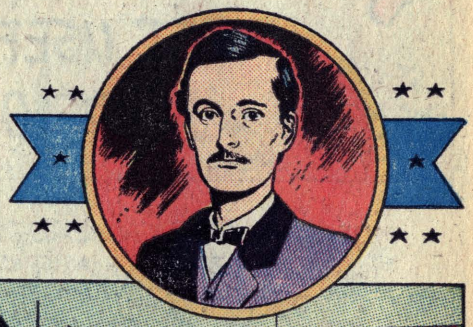
IN 1839, CHARLES GOODYEAR DISCOVERED THE WAY TO "CURE" RUBBER OF **STICKINESS** AND **BRITTLENESS.** HE ADDED SULPHUR AND **TREATED THE COMPOUND WITH HEAT.** IN HONOR OF THE FATHER OF VULCANIZING, MANY COMPANIES HAVE USED "GOODYEAR" IN THEIR FIRM NAMES.

WATERPROOFING QUALITIES OF RUBBER OFFERED MUCH PROMISE AND DURING THE 18TH AND EARLY 19TH CENTURIES A NUMBER OF PRODUCTS WERE MADE OF IT, INCLUDING THE FAMOUS *"MACINTOSH"* NAMED FOR ITS INVENTOR, CHARLES MACINTOSH.

"VULCAN," THE ROMAN GOD OF FIRE AND FORGE FROM WHOM THIS PROCESS OF *"VULCANIZING"* RUBBER GETS ITS NAME.

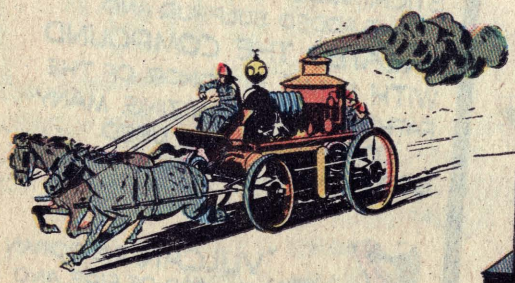
1870 DR. B. F. GOODRICH ESTABLISHES FIRST RUBBER PLANT IN AKRON_

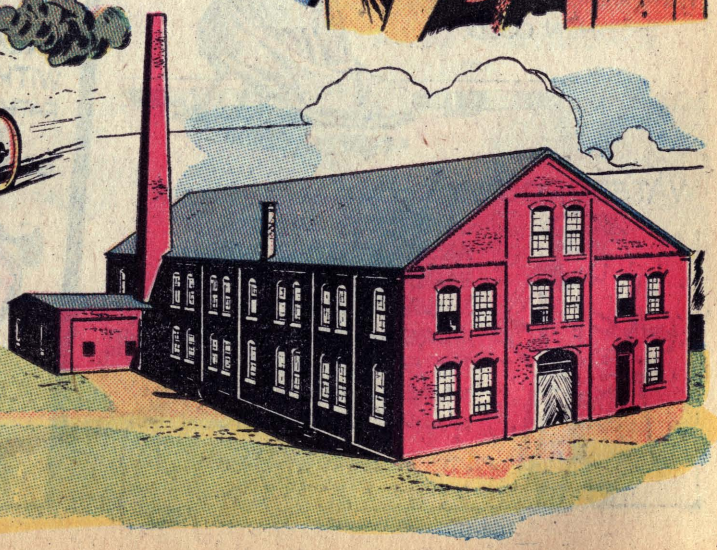
DR. BENJAMIN FRANKLIN GOODRICH SERVED WITH DISTINCTION AS A SURGEON IN THE WAR BETWEEN THE STATES. HE ACQUIRED A SMALL RUBBER COMPANY AT HASTINGS-ON-THE-HUDSON IN SETTLEMENT OF A DEBT.



IN 1870, 31 YEARS AFTER THE DISCOVERY OF VULCANIZATON, DR. GOODRICH, HEARING OF THE FAVORABLE TRANSPORTATION FACILITIES OF AKRON, OHIO (RAILROADS AND THE OHIO CANAL), TRAVELED TO AKRON TO DISCUSS WITH BUSINESS LEADERS THE ADVISABILITY OF RE-LOCATING HIS COMPANY THERE.

AFTER CONSIDERABLE EFFORT, DR. GOODRICH SUCCEEDED IN BORROWING ENOUGH MONEY AND ENLISTING SUFFICIENT SUPPORT TO BUILD AND OPERATE THE **FIRST RUBBER PLANT WEST OF THE ATLANTIC SEABOARD.**

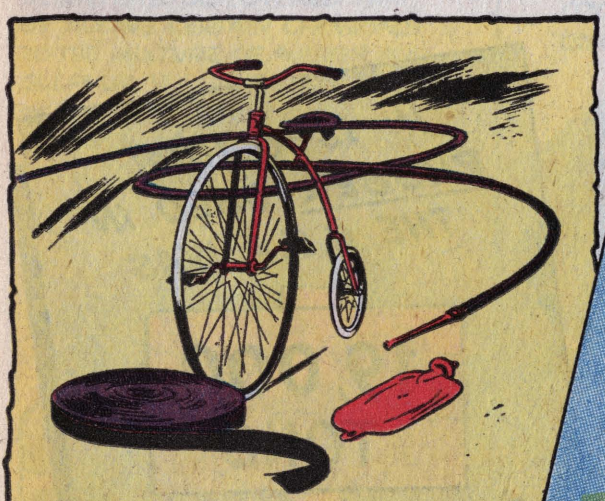




THE B.F. GOODRICH PLANT IN AKRON WAS THE FIRST TO MAKE **RUBBER FIRE HOSE.** PREVIOUSLY FIRE HOSE HAD BEEN MADE OF LEATHER.

FOR ABOUT 15 YEARS AFTER ITS MODEST BEGINNING, THE YOUNG B.F. GOODRICH ENTERPRISE WENT THROUGH SOME DIFFICULT TIMES. BUT ONCE PAST THESE EARLY TROUBLES IT GREW RAPIDLY TO BECOME ONE OF AMERICA'S LARGEST MANUFACTURERS OF RUBBER PRODUCTS.

AS A RESULT OF DR. GOODRICH MOVING HIS PLANT TO AKRON, THAT CITY HAS BECOME THE LARGEST RUBBER MANUFACTURING CENTER OF THE WORLD!



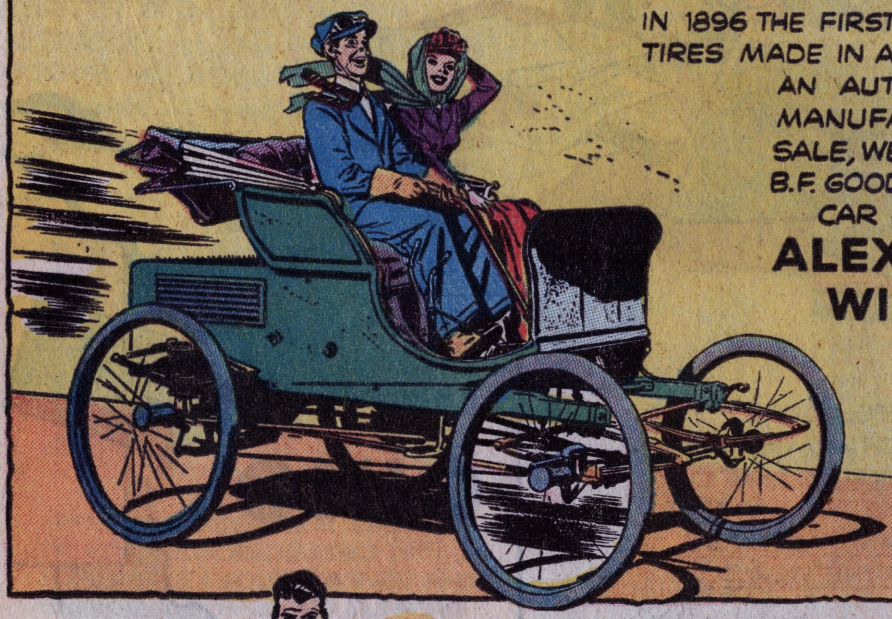
HERE ARE SOME EARLY PRODUCTS OF THE FIRST B.F. GOODRICH FACTORY IN AKRON. SINCE THEN RUBBER HAS PLAYED A GROWING PART IN OUR DAILY LIVES.

IN 1870, TOTAL CONSUMPTION OF RUBBER IN THE U.S.A. WAS

4000 TONS

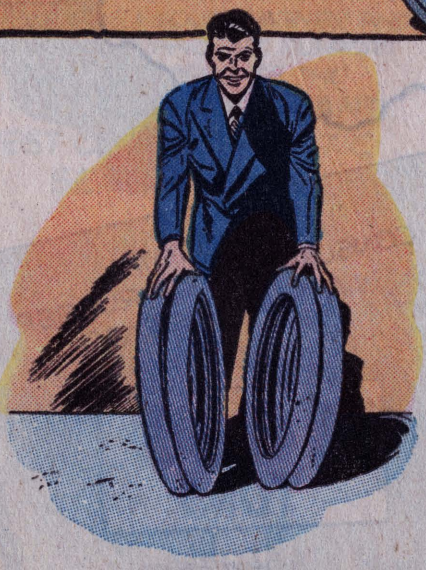
(WATCH HOW THIS FIGURE INCREASES AS YOU GO THROUGH THIS BOOK)

THE AUTOMOBILE ENTERS THE PICTURE—

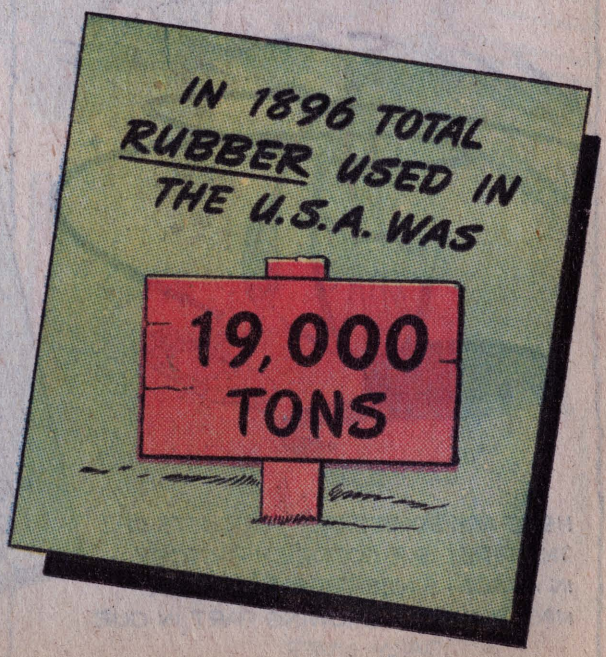


IN 1896 THE FIRST PNEUMATIC TIRES MADE IN AMERICA FOR AN AUTOMOBILE, MANUFACTURED FOR SALE, WERE MADE BY B.F. GOODRICH FOR A CAR BUILT BY

ALEXANDER WINTON



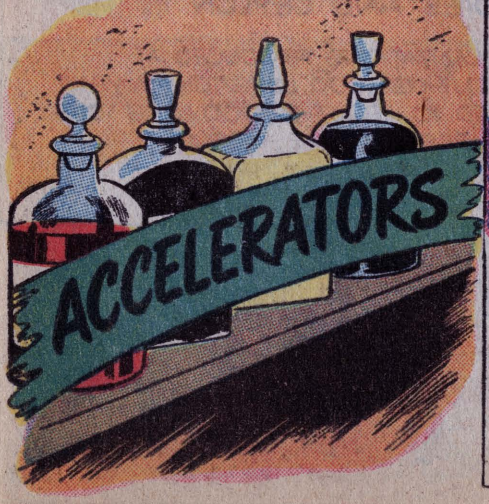
THESE ARE THE ORIGINAL TIRES FOR THE 1896 WINTON CAR. THEIR SUPERIORITY OVER SOLID TIRES, GAVE IMPETUS TO THE AUTOMOBILE'S DEVELOPMENT, LAID THE FOUNDATION OF TODAY'S GREAT TIRE INDUSTRY.



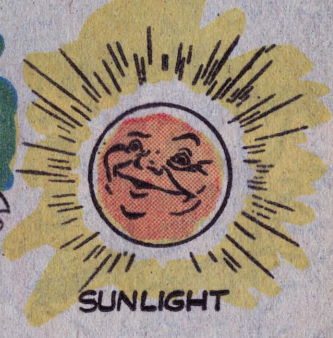
THE LABORATORY MEETS THE CHALLENGE—

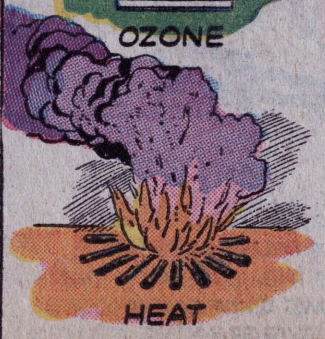
IN 1895 THE FIRST AMERICAN RESEARCH LABORATORY IN THE RUBBER INDUSTRY WAS ESTABLISHED BY CHARLES C. GOODRICH, CHEMIST SON OF THE FOUNDER OF B.F. GOODRICH.

SCIENTISTS DISCOVERED THAT BY ADDING CERTAIN CHEMICALS TO THE MIXTURE OF RUBBER AND SULPHUR, VULCANIZATION COULD BE *SPEEDED*. SO THESE CHEMICALS BECAME KNOWN AS "ACCELERATORS."



OZONE, WHICH IS PART OF THE AIR, SUNLIGHT, HEAT AND OIL ARE THE WORST ENEMIES OF CRUDE RUBBER PRODUCTS. TO MAKE RUBBER LAST LONGER, SCIENTISTS DEVELOPED *"ANTI-OXIDANTS"* TO COMBAT OZONE, AND *"AGE RESISTORS"* TO COMBAT RUBBER'S OTHER ENEMIES.





IN 1876 **SIR HENRY WICKHAM**

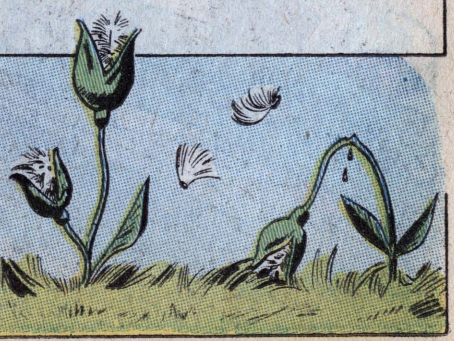
WAS COMMISSIONED BY THE BRITISH GOVERNMENT TO OBTAIN SEEDS OF THE ***RUBBER OR "HEVEA" TREE*** FROM BRAZIL. THESE WERE PLANTED IN KEW GARDENS, ENGLAND.

LATER THE YOUNG TREES WERE TRANSPLANTED TO CEYLON WHERE CLIMATE AND SOIL CONDITIONS WERE MORE FAVORABLE.

AS DEMAND FOR RUBBER INCREASED, VAST AREAS OF JUNGLE LAND WERE CLEARED AND PLANTED WITH RUBBER TREES. LARGEST ACREAGE WAS DEVELOPED IN BRITISH MALAYA, DUTCH EAST INDIES AND CEYLON.

THESE PLANTATIONS PRODUCED AT PEAK ABOUT 1,130,000 LONG TONS A YEAR COMPARED TO ABOUT 22,000 LONG TONS FOR THE REST OF THE WORLD.

RUBBER IS CONTAINED IN A MILKY SUBSTANCE CALLED "LATEX". ANYONE FAMILIAR WITH THE COMMON MILKWEED KNOWS WHAT LATEX LOOKS LIKE. WHEN THE STEM OF THIS PLANT IS BROKEN, A MILKY SUBSTANCE, RESEMBLING LATEX FROM THE HEVEA TREE, OOZES OUT.

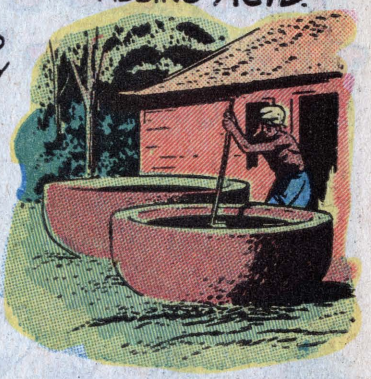


TAPPING HEVEA TREE FOR LATEX

A NARROW GROOVE IS CUT AROUND THE TREE ABOUT 4½ FEET ABOVE GROUND. THE CHANNEL IS LOWERED ABOUT ONCE A MONTH. BY THE TIME THE CUTS ARE CLOSE TO THE GROUND, BARK HAS GROWN OVER THE ORIGINAL CUTS.

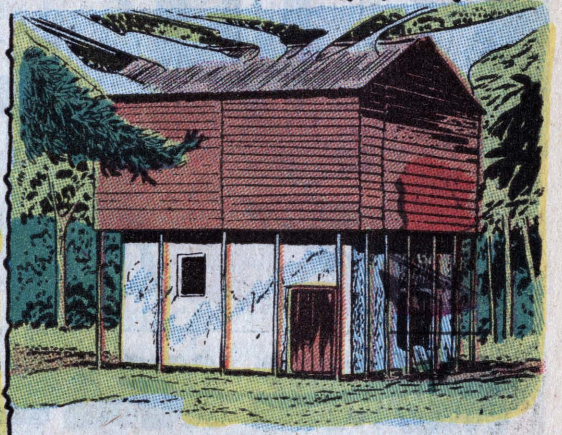
SOME TREES HAVE BEEN YIELDING RUBBER FOR **30 YEARS!**

AFTER LATEX IS COLLECTED IT IS "COAGULATED" IN LARGE TANKS BY ADDING *ACID*.

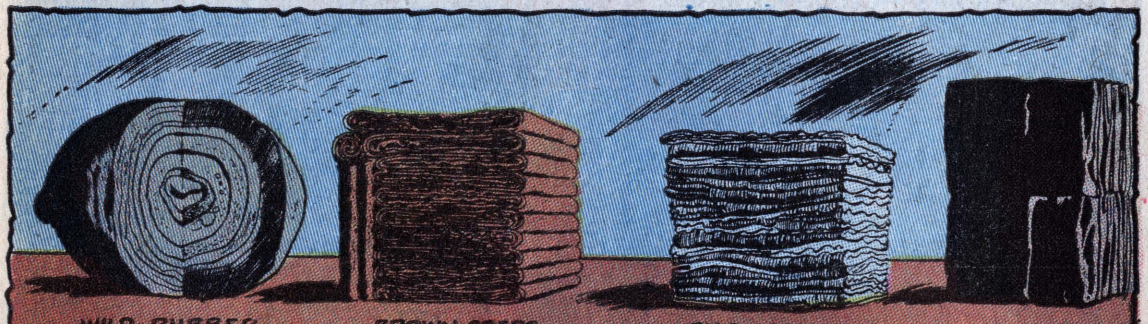


PREPARING CRUDE RUBBER FOR MARKET

AFTER COAGULATION, SEVERAL DIFFERENT GRADES OF CRUDE RUBBER ARE PREPARED FOR MARKET. THE GRADE KNOWN AS "PALE CREPE" IS SQUEEZED BETWEEN CORRUGATED ROLLERS AND HUNG TO DRY.



THE GRADE KNOWN AS "*RIBBED SMOKE SHEET*" IS DRIED IN THE SMOKE OF A WOOD FIRE IN A *SMOKEHOUSE*.



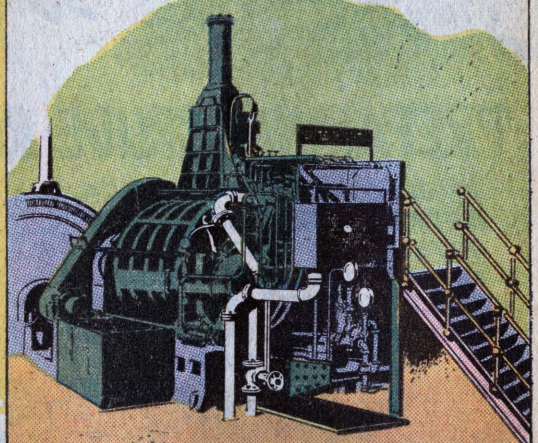
THESE ARE FOUR TYPES OF ...

CRUDE RUBBER READY FOR SHIPMENT!

MANUFACTURE OF RUBBER ARTICLES STARTS WITH THE RIGHT "COMPOUND"

EACH PRODUCT REQUIRES ITS OWN SPECIAL MIXTURE. HUNDREDS OF DIFFERENT **RECIPES** ARE USED, DEPENDING ON WHETHER THE PRODUCT IS TO BE SOFT OR HARD, FLEXIBLE OR STIFF.

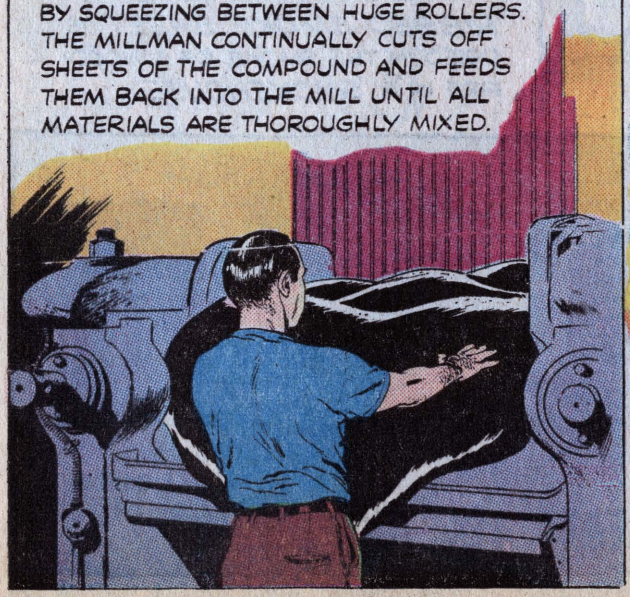
BANBURY MIXER

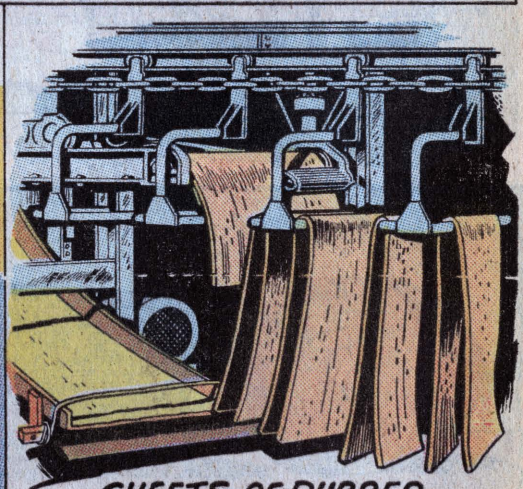


WHEN A LARGE QUANTITY OF RUBBER COMPOUND IS USED, IT IS PREPARED IN THIS LARGE MIXING MACHINE.

MIXING MILL —

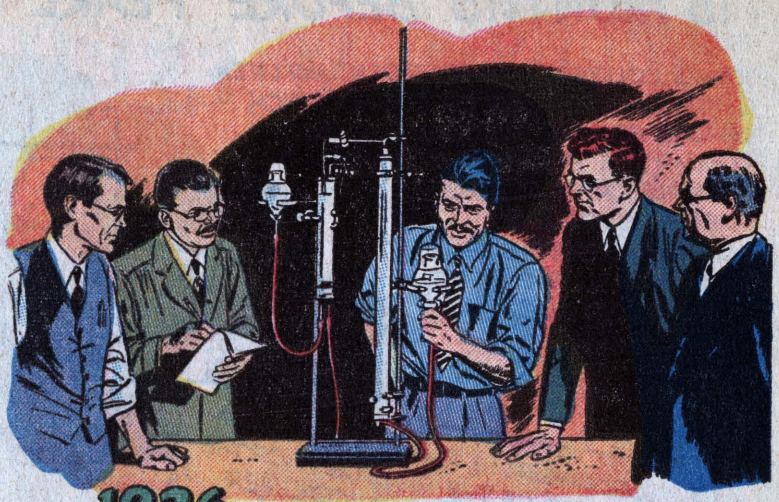
SOME RUBBER COMPOUNDS ARE PREPARED BY SQUEEZING BETWEEN HUGE ROLLERS. THE MILLMAN CONTINUALLY CUTS OFF SHEETS OF THE COMPOUND AND FEEDS THEM BACK INTO THE MILL UNTIL ALL MATERIALS ARE THOROUGHLY MIXED.

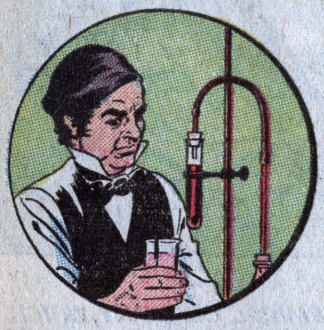




SHEETS OF RUBBER FROM THE MIXING MILL ARE DIPPED IN A SPECIAL SOLUTION TO KEEP THEM FROM STICKING — THEN ARE REMOVED BY AUTOMATIC CONVEYORS

EARLY IN THE 19TH CENTURY THE ENGLISH SCIENTIST FARADAY DISCOVERED THAT RUBBER IS COMPOSED OF ATOMS OF HYDROGEN AND CARBON JOINED TOGETHER IN A DEFINITE PATTERN TO MAKE UP A RUBBER MOLECULE.





1926... REALIZING THE DESIRABILITY OF AMERICAN INDEPENDENCE FROM FOREIGN SOURCES OF CRUDE RUBBER, THE B.F. GOODRICH COMPANY ASSIGNED A GROUP OF SCIENTISTS, UNDER DIRECTION OF DR. WALDO L. SEMON, TO STUDY THE PROBLEM OF MAKING RUBBER FROM MATERIALS FOUND IN AMERICA.

JUNE 5, 1940-

AT CEREMONY ANNOUNCING THE B.F. GOODRICH "AMERIPOL" TIRE, DR. WALDO SEMON DEMONSTRATES ONE STEP IN THE MAKING OF THIS NEW TYPE RUBBER.

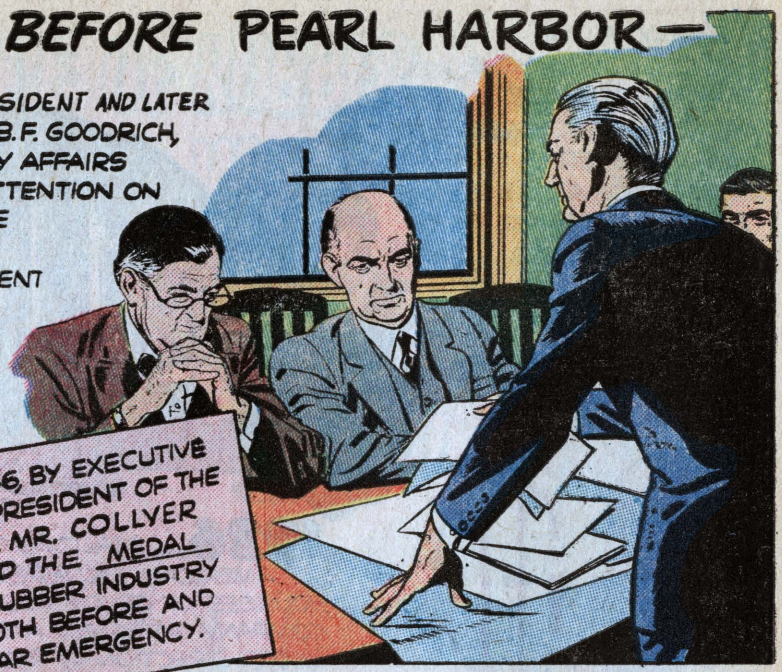
TO EMPHASIZE AMERICA'S NEED TO BECOME SELF-SUFFICIENT IN THE PRODUCTION OF RUBBER, JOHN L. COLLYER, THEN PRESIDENT OF THE B.F. GOODRICH COMPANY, ANNOUNCED A NEW TIRE CONTAINING MORE THAN 50% AMERICAN-MADE RUBBER CALLED "AMERIPOL"—THE RESULT OF 14 YEARS OF RESEARCH AND TESTING. THIS WAS THE FIRST TIRE OF ITS KIND OFFERED FOR SALE TO MOTORISTS.

IN 1940 TOTAL RUBBER USED IN THE U.S.A. WAS

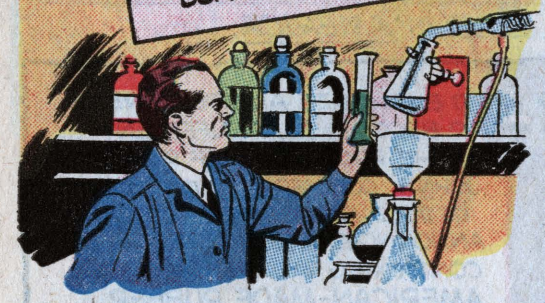
650,000 TONS

18 MONTHS *BEFORE* PEARL HARBOR—

JOHN L. COLLYER, THEN PRESIDENT AND LATER CHAIRMAN OF THE BOARD OF B.F. GOODRICH, BEFORE SENATE MILITARY AFFAIRS COMMITTEE, FOCUSED ATTENTION ON NATION'S CRITICAL CRUDE RUBBER SUPPLY BY ADVOCATING ESTABLISHMENT OF NATIONAL FACILITIES FOR MAKING AMERICAN RUBBER.



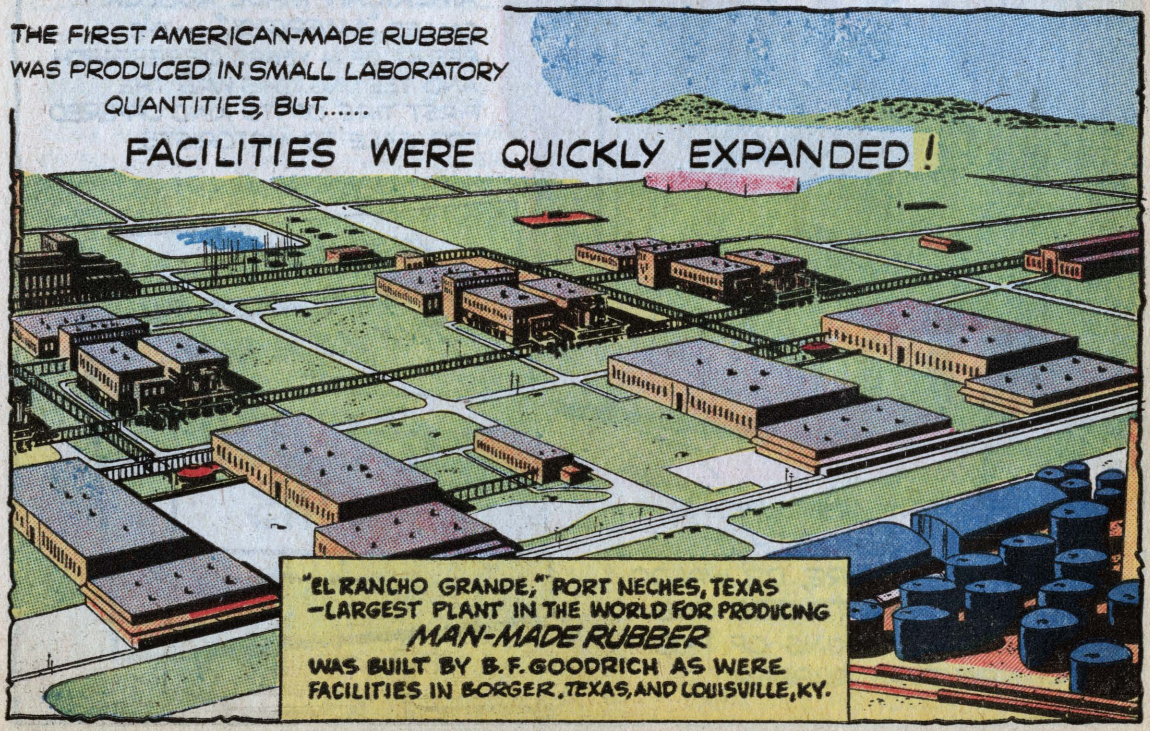
DECEMBER 18, 1946, BY EXECUTIVE ORDER OF THE PRESIDENT OF THE UNITED STATES, MR. COLLYER WAS AWARDED THE MEDAL OF MERIT FOR RUBBER INDUSTRY LEADERSHIP BOTH BEFORE AND DURING THE WAR EMERGENCY.



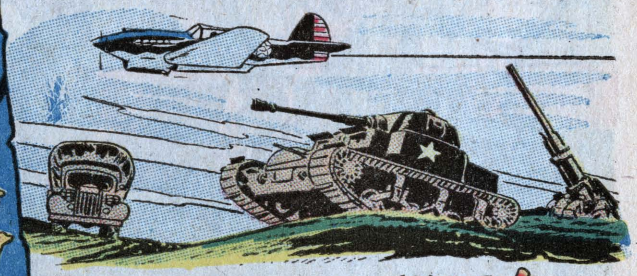
B.F.GOODRICH CHEMICAL COMPANY, WHICH OPERATED GOVERNMENT AND PRIVATELY-OWNED PLANTS DEVOTED TO THE MANUFACTURE OF AMERICAN-MADE RUBBER, DURING WORLD WAR II, NOW PRODUCES ACCELERATORS, AGE RESISTORS, HYCAR SPECIAL-PURPOSE RUBBERS AND CHEMICALS FOR INDUSTRY.

THE FIRST AMERICAN-MADE RUBBER WAS PRODUCED IN SMALL LABORATORY QUANTITIES, BUT.....

FACILITIES WERE QUICKLY EXPANDED!

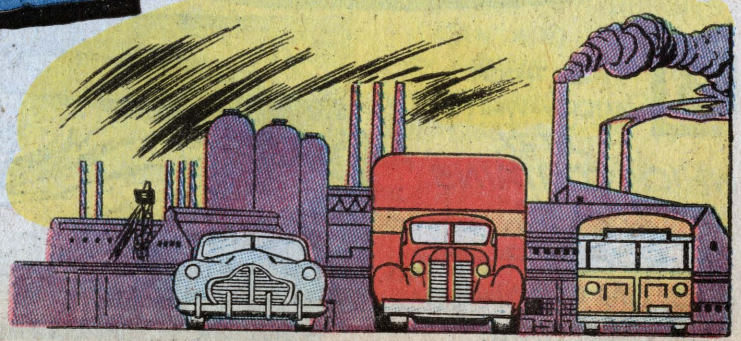


"EL RANCHO GRANDE," PORT NECHES, TEXAS —LARGEST PLANT IN THE WORLD FOR PRODUCING *MAN-MADE RUBBER* WAS BUILT BY B.F. GOODRICH AS WERE FACILITIES IN BORGER, TEXAS, AND LOUISVILLE, KY.



AMERICA WAS AT **WAR!** IT WAS A MECHANIZED WAR, REQUIRING *INCREASED RUBBER* IN COMBAT AND TRANSPORT VEHICLES AND *AIRCRAFT.*

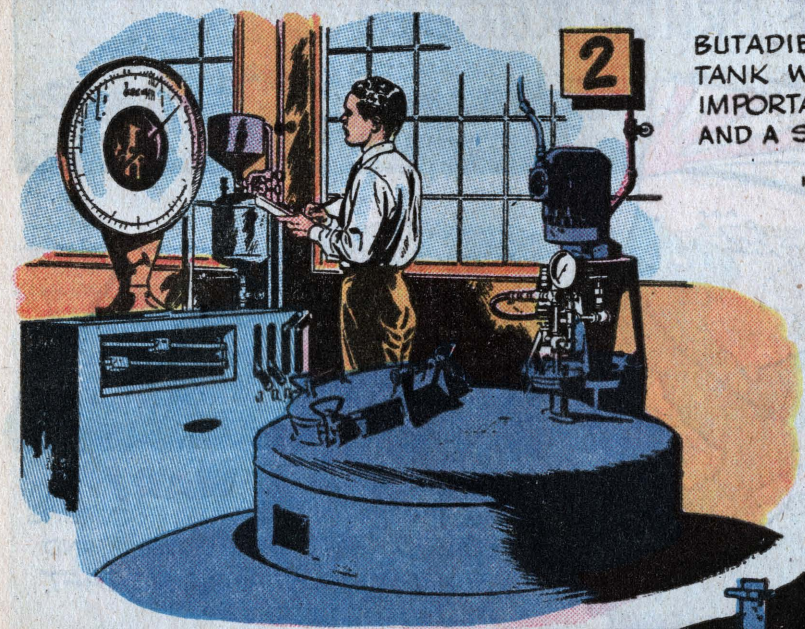
AT HOME 31,000,000 CIVILIAN CARS, TRUCKS AND BUSES HAD TO BE KEPT ROLLING TO SUPPLY THE SINEWS OF WAR.



HOW AMERICAN-MADE RUBBER IS PRODUCED —

1 ONE OF THE MOST IMPORTANT PARTS OF AMERICAN-MADE RUBBER, BUTADIENE, IS STORED IN THESE CYLINDERS UNDER PRESSURE. IT CAN BE MADE FROM EITHER PETROLEUM OR ALCOHOL.

2 BUTADIENE IS PUT IN A STEEL TANK WITH THE OTHER MOST IMPORTANT PART, STYRENE, AND A SOAP SOLUTION, WITH SMALL AMOUNTS OF "SALT AND PEPPER" INGREDIENTS, IS ADDED. IN THESE TANKS, IT IS STIRRED UNDER PRESSURE AND COMES OUT IN A MILKY-WHITE LIQUID CALLED LATEX.



3 THIS THICK MILKY-WHITE LATEX *WHICH CONTAINS* **2½ LBS.** *OF RUBBER PER GALLON* IS STIRRED IN LARGE VATS.

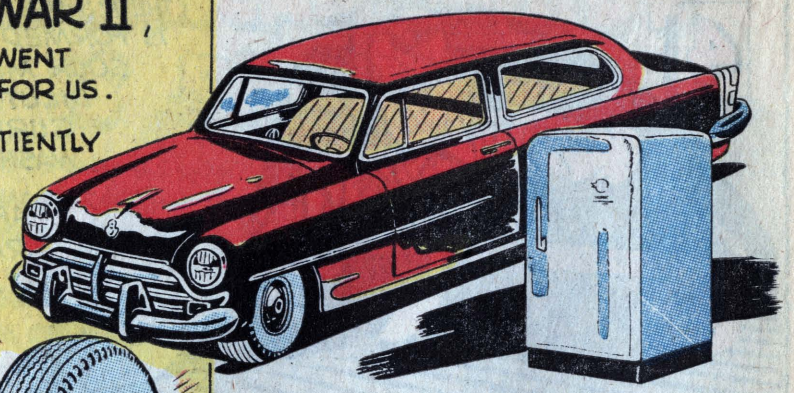
4
THE RUBBER IN THE LATEX IS FORMED LIKE CURDS IN SOUR MILK BY ADDING DILUTE ACIDS, THE CURDS ARE THEN WASHED IN LARGE VATS.
AFTER DRYING, THE RAW RUBBER IS BALED FOR SHIPMENT.
FIRST MAN-MADE "TREE" RUBBER
GOODRICH-GULF SCIENTISTS DISCOVERED "AMERIPOL SN", THE MAN-MADE DUPLICATE OF TREE RUBBER IN 1954.
OUT OF THIS CAME A NEW CLASS OF RUBBERS— THE STEREOS!
THESE STEREOS ARE IN PRODUCTION AT THE AMERIPOL, INC. PLANT, AT ORANGE, TEXAS.
"AMERIPOL CB" IS THE TOUGHEST OF THE NEW STEREO RUBBERS. IT CAN ADD 35% OR MORE TO TIRE WEAR, AND — OF IMPORTANCE IN MILITARY USE — KEEPS ITS GOOD PROPERTIES AT 100° BELOW ZERO!

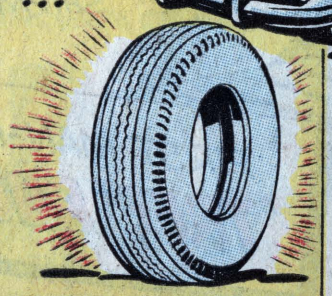
AFTER WORLD WAR II,

MAN-MADE RUBBER WENT RIGHT ON WORKING FOR US.

PEOPLE WERE IMPATIENTLY WAITING FOR

NEW CARS - REFRIGERATORS AND TIRES ...





--- AND ALL THE THINGS THAT WERE IMPOSSIBLE TO GET DURING THE WAR!

--- WITHOUT AMERICAN-MADE RUBBER, CHANGING OVER FROM WAR TO PEACE WOULD HAVE TAKEN YEARS LONGER AND COST THE PUBLIC SEVERAL HUNDRED MILLIONS IN THE HIGHER PRICES IT WOULD HAVE PAID FOR RUBBER PRODUCTS.

THEN CAME AGGRESSION IN KOREA!

WITH THE OUTBREAK OF HOSTILITIES IN KOREA, AMERICAN-MADE RUBBER SAVED THE DAY AGAIN!

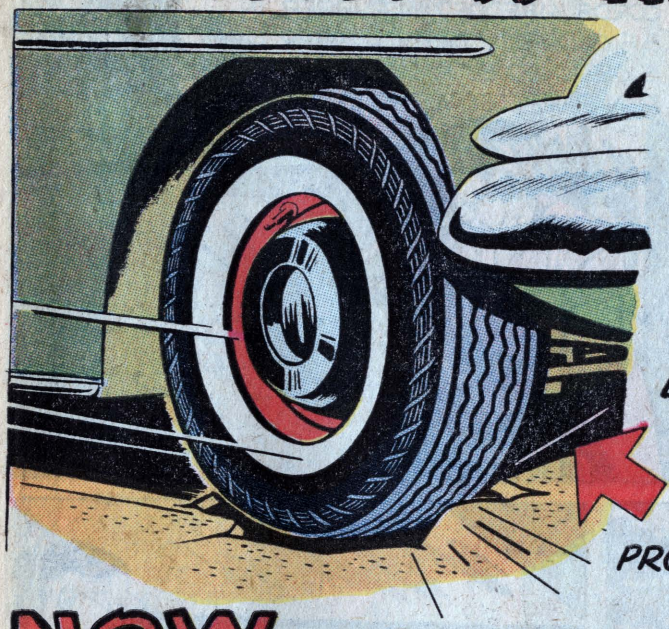
MAN-MADE RUBBER PRODUCTION WAS STEPPED UP TO REPLACE VAST AMOUNTS OF CRUDE RUBBER TAKEN OFF THE MARKET TO BUILD A MILITARY STOCKPILE IN THE UNITED STATES!

RAYON INSIDE HEEL REINFORCEMENT.
HERMETICALLY SEALED DEAD AIR CHAMBER SURROUNDS FOOT AND ANKLE.
THICK FELT INSOLE SEALED INTO AIR CHAMBER FOR COMFORT AND INSULATION.
LATEX INNER AND OUTER WALL FOR PERFECT SEAL.

"THERMOS BOOT"

--- DEVELOPED BY B.F. GOODRICH FOR THE ARMED SERVICES IN KOREA, THIS BOOT, CALLED THE "**SUBZERO PAC**", IS NOW AVAILABLE TO THE GENERAL PUBLIC! BUILT ON THE PRINCIPAL OF THE THERMOS BOTTLE, IT INSULATES THE FOOT AGAINST TEMPERATURES AS LOW AS 40 DEGREES BELOW ZERO!

BFG TUBELESS TIRES MADE HISTORY!



WHEN AUTOMOBILES FIRST CAME INTO USE, SCIENTISTS BEGAN WORKING TO DEVELOP A TIRE THAT WOULD HOLD AIR WITHOUT THE AID OF AN INNER TUBE! (INNER TUBES OFTEN CAUSE DANGEROUS BLOWOUTS AND FLATS.) HUNDREDS OF UNSUCCESSFUL ATTEMPTS WERE MADE – OFTEN THE SEARCH APPEARED HOPELESS.

BUT IN 1947 B.F.GOODRICH SCIENTISTS FOUND NEW RUBBERS AND PROCESSES WHICH PROVIDED THE FIRST PRACTICABLE ANSWER —

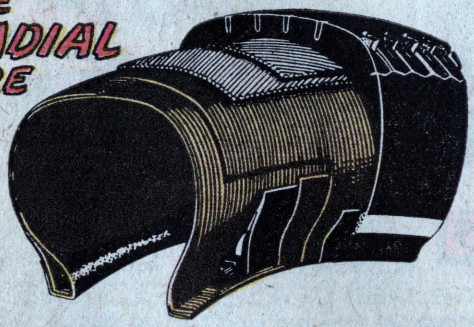
A TUBELESS TIRE THAT PROTECTS AGAINST BLOWOUTS!

HERE'S HOW–

IMPACTS WHICH WOULD CAUSE A BLOWOUT IN A TUBE-TYPE TIRE CAUSE ONLY A PINHOLE LEAK IN A TUBELESS TIRE'S INNER RUBBER LINING. AIR ESCAPES SLOWLY– **NO SUDDEN BLOWOUT!**

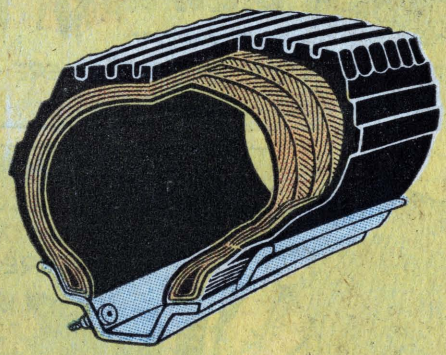
NOW...

THE RADIAL TIRE



IN 1962, BFG BEGAN DEVELOPING A TUBELESS RADIAL PASSENGER TIRE DESIGNED FOR GREATER SAFETY AND LONGER WEAR. RADIAL CONSTRUCTION (ABOVE) DIFFERS GREATLY FROM CONVENTIONAL TIRES (RIGHT).→

CROSS-SECTION OF TUBELESS TIRE



NEW RUBBERS, NEW TREAD DESIGNS AND IMPROVED CORD ARE COMBINED IN THE B.F.GOODRICH H.T. SILVERTOWN TIRE FOR EXTRA MILEAGE, BLOWOUT PROTECTION, EASY RIDING, HIGH SPEED SAFETY, EXTRA STRENGTH AND QUIET RUNNING!

3 SIGNIFICANT DATES IN AUTO TIRE PROGRESS IN U.S.A.

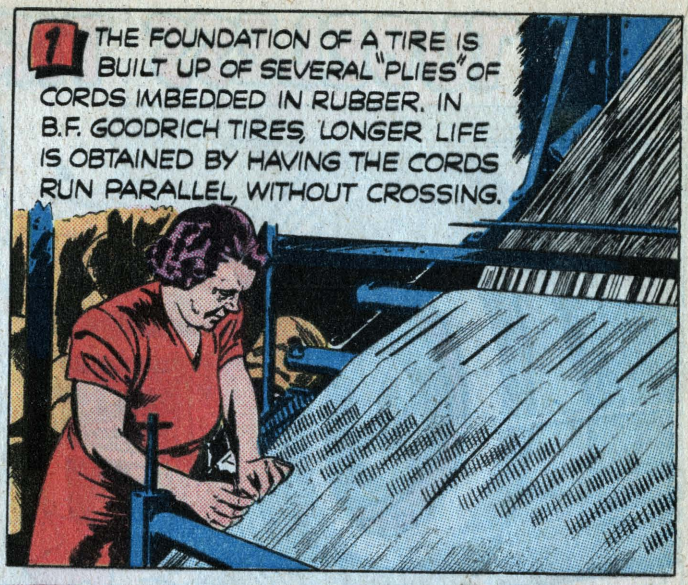
1893 FIRST SOLID RUBBER AUTO TIRE

1896 FIRST TUBE TYPE PNEUMATIC TIRE

1947 FIRST TUBELESS TIRE —

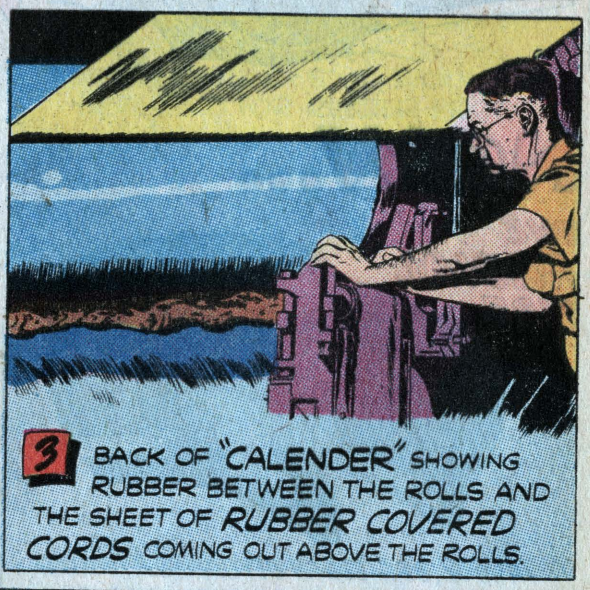
MOST IMPORTANT TIRE DEVELOPMENT IN OVER 50 YEARS!

HOW A TIRE IS MADE -

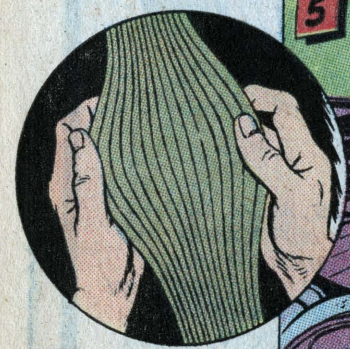


1 THE FOUNDATION OF A TIRE IS BUILT UP OF SEVERAL "PLIES" OF CORDS IMBEDDED IN RUBBER. IN B.F. GOODRICH TIRES, LONGER LIFE IS OBTAINED BY HAVING THE CORDS RUN PARALLEL, WITHOUT CROSSING.

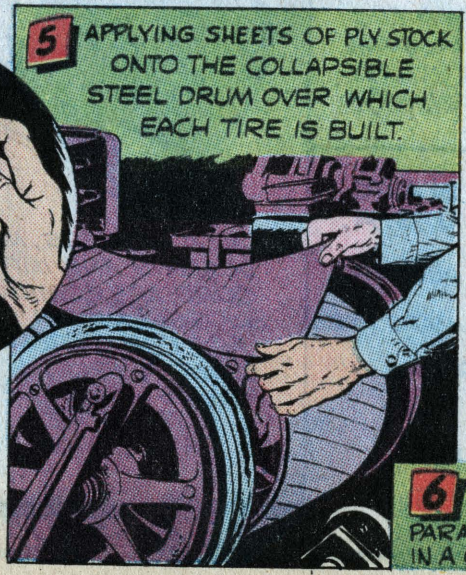
2 THE CORDS ARE PASSED THROUGH A "CALENDER" WHERE THEY ARE COVERED WITH RUBBER.



3 BACK OF "CALENDER" SHOWING RUBBER BETWEEN THE ROLLS AND THE SHEET OF *RUBBER COVERED CORDS* COMING OUT ABOVE THE ROLLS.

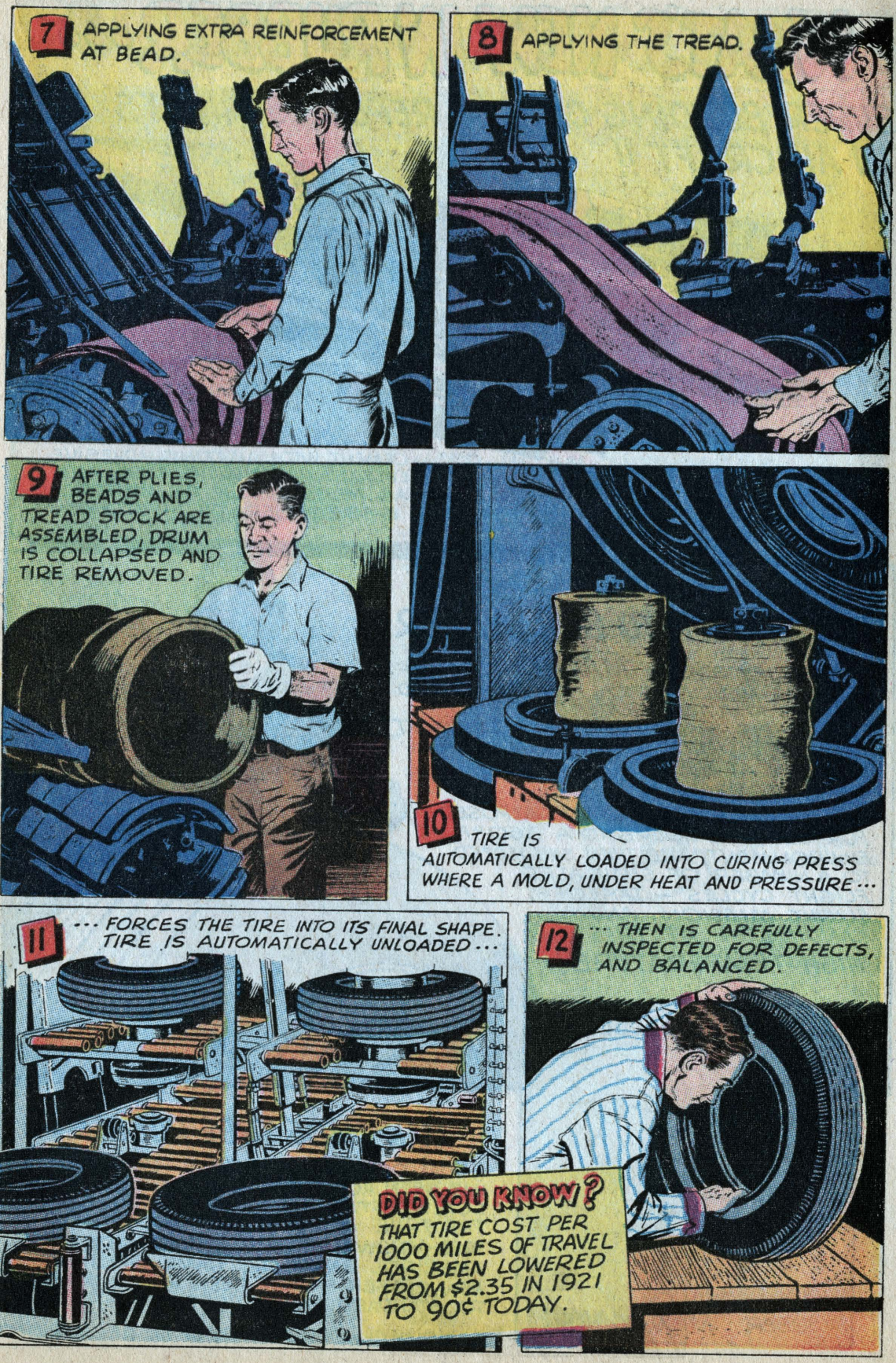


4 EACH CORD IS ENTIRELY SURROUNDED BY RUBBER.



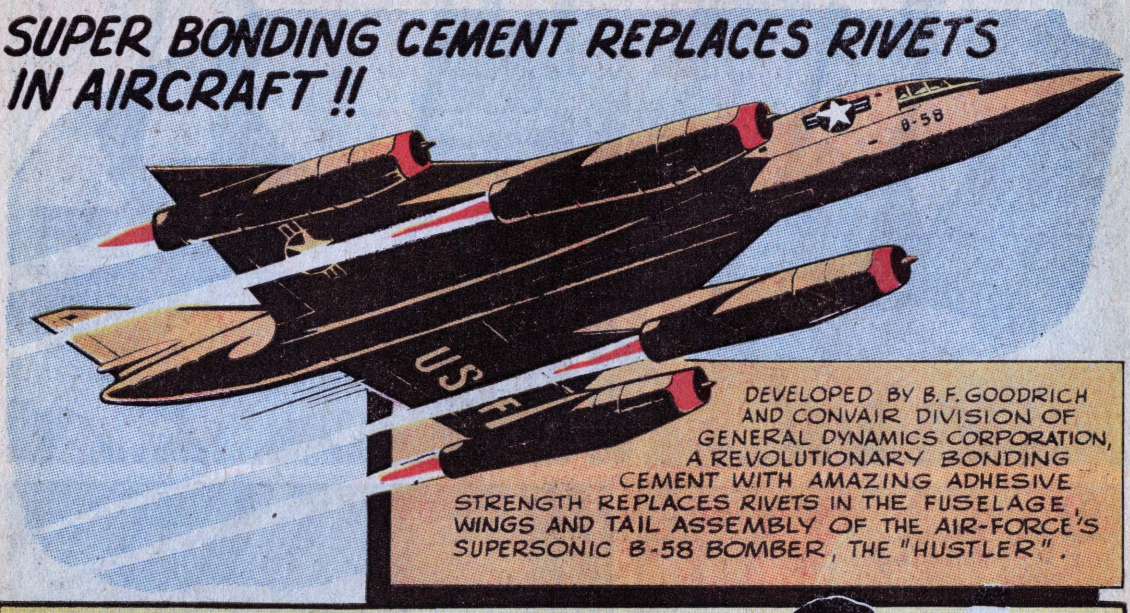
5 APPLYING SHEETS OF PLY STOCK ONTO THE COLLAPSIBLE STEEL DRUM OVER WHICH EACH TIRE IS BUILT.

6 WRAPPING PLIES AROUND BEADS TO HOLD BEADS IN PLACE. BEADS — PARALLEL RINGS OF WIRE WRAPPED IN A COATED FABRIC — HOLD TIRE ON RIM.


7 APPLYING EXTRA REINFORCEMENT AT BEAD.
8 APPLYING THE TREAD.
9 AFTER PLIES, BEADS AND TREAD STOCK ARE ASSEMBLED, DRUM IS COLLAPSED AND TIRE REMOVED.
10 TIRE IS AUTOMATICALLY LOADED INTO CURING PRESS WHERE A MOLD, UNDER HEAT AND PRESSURE ...
11 ... FORCES THE TIRE INTO ITS FINAL SHAPE. TIRE IS AUTOMATICALLY UNLOADED ...
12 ... THEN IS CAREFULLY INSPECTED FOR DEFECTS, AND BALANCED.
DID YOU KNOW?
THAT TIRE COST PER 1000 MILES OF TRAVEL HAS BEEN LOWERED FROM $2.35 IN 1921 TO 90¢ TODAY.

WHAT'S NEW IN RUBBER...

SUPER BONDING CEMENT REPLACES RIVETS IN AIRCRAFT !!



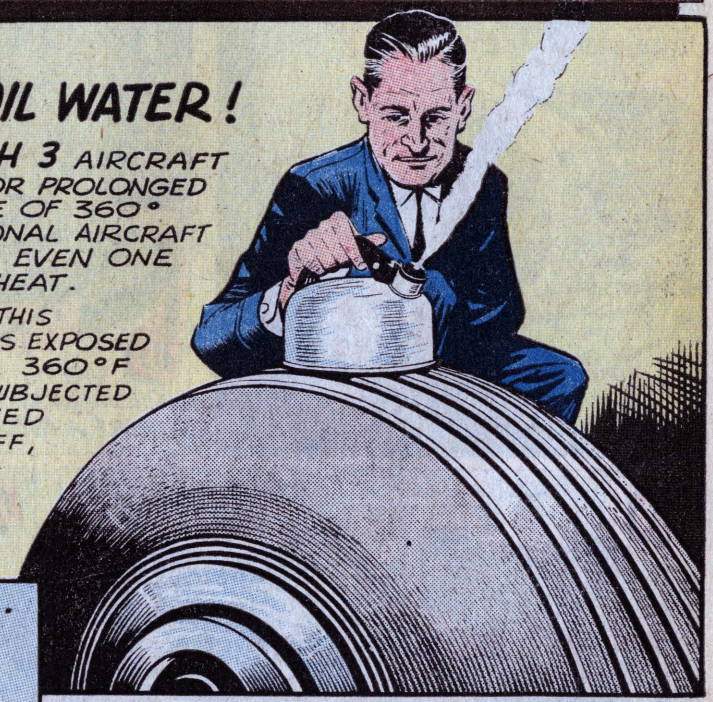
DEVELOPED BY B.F. GOODRICH AND CONVAIR DIVISION OF GENERAL DYNAMICS CORPORATION, A REVOLUTIONARY BONDING CEMENT WITH AMAZING ADHESIVE STRENGTH REPLACES RIVETS IN THE FUSELAGE, WINGS AND TAIL ASSEMBLY OF THE AIR-FORCE'S SUPERSONIC B-58 BOMBER, THE "HUSTLER".

THIS AIRCRAFT TIRE IS

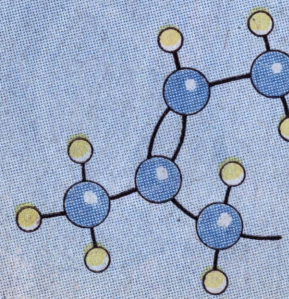
HOT ENOUGH TO BOIL WATER !

TO QUALIFY FOR THE **MACH 3** AIRCRAFT THIS TIRE MUST FUNCTION FOR PROLONGED PERIODS AT A TEMPERATURE OF 360° FAHRENHEIT — CONVENTIONAL AIRCRAFT TIRES COULD NOT SURVIVE EVEN ONE MISSION AT SUCH OVEN HEAT.

IN QUALIFICATION TESTS, THIS **B. F. GOODRICH** TIRE WAS EXPOSED FOR SEVERAL HOURS TO A 360°F ENVIRONMENT, AND THEN SUBJECTED TO A NUMBER OF SIMULATED FLIGHT CYCLES — TAKEOFF, FLIGHT MISSION, AND LANDING — **AT THIS HIGH TEMPERATURE !**



RUBBER MOLECULE ···



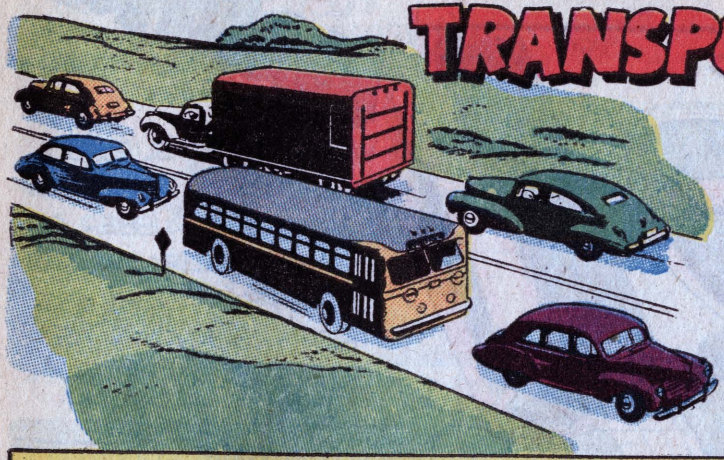
TREE-GROWN OR **MAN-MADE !**

MAN-MADE TREE RUBBER ··

A GOAL OF WORLD SCIENTISTS FOR GENERATIONS, HAS BEEN ACHIEVED BY **AMERIPOL INC.*** SCIENTISTS, WHEN THEY REPRODUCED THE TRUE MOLECULE OF CRUDE, OR TREE-GROWN, RUBBER. TIRES MADE OF AMERIPOL SN ···· THE NAME GIVEN THE NEW RUBBER ··· HAVE BEEN FOUND SUPERIOR TO STANDARD TRUCK TIRES IN TESTS.

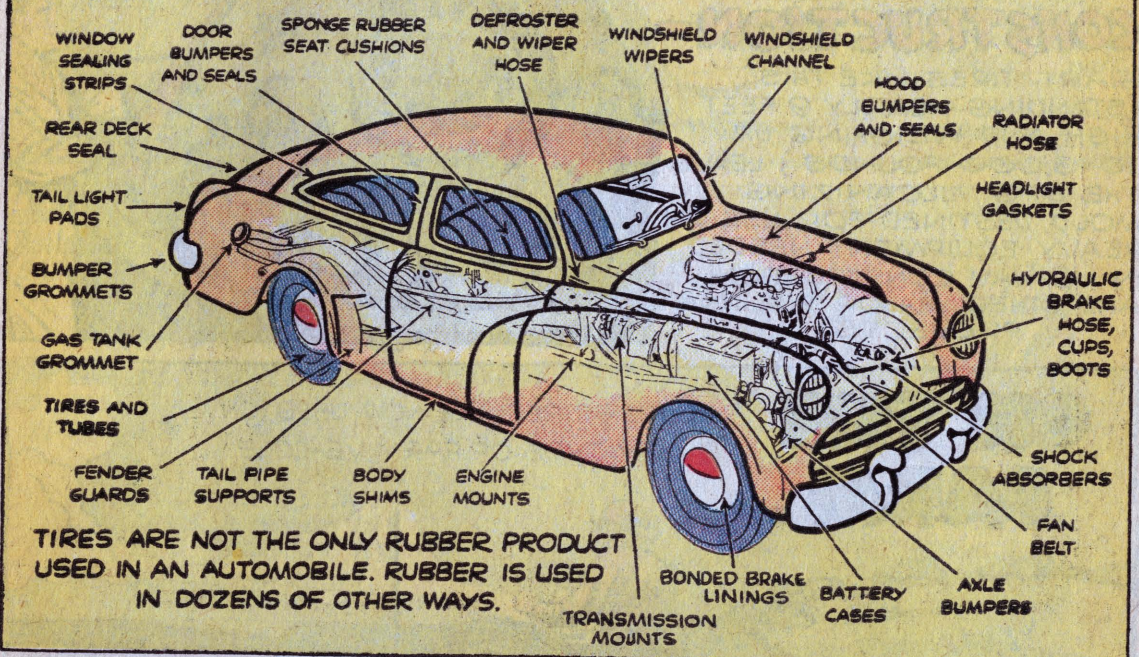
* A WHOLLY OWNED SUBSIDIARY OF THE B.F.GOODRICH CO.

RUBBER IN AUTOMOTIVE TRANSPORTATION



AMERICA IS A LAND OF AUTOMOTIVE TRANSPORTATION. PASSENGER CARS, TRUCKS, AND BUSES ALL MUST ROLL ON RUBBER TIRES. 54,000 COMMUNITIES IN THE U.S.A. DEPEND ENTIRELY UPON AUTOMOTIVE TRANSPORTATION.

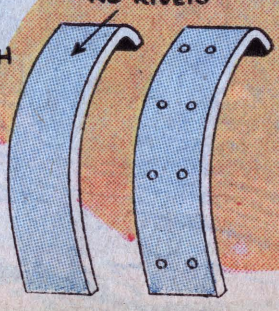
WHERE RUBBER IS USED IN AN AUTOMOBILE



TIRES ARE NOT THE ONLY RUBBER PRODUCT USED IN AN AUTOMOBILE. RUBBER IS USED IN DOZENS OF OTHER WAYS.

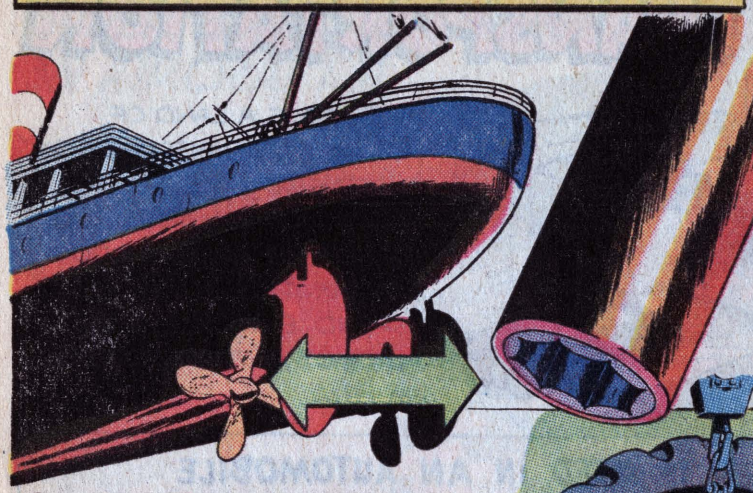
AMAZING ADHESIVE BONDS BRAKE LININGS TO BRAKE SHOES WITHOUT RIVETS –

BRAKE LININGS BONDED WITH A NEW B. F. GOODRICH RUBBER ADHESIVE CALLED *PLASTILOCK* GIVE UP TO TWICE THE SERVICE OF RIVETED LININGS AND HAVE MORE THAN FIVE TIMES GREATER SHEAR STRENGTH!



IN THE U.S.A. IN 1969 **2,600,000 TONS** OF RUBBER WERE USED!

RUBBER IN TRANSPORTATION

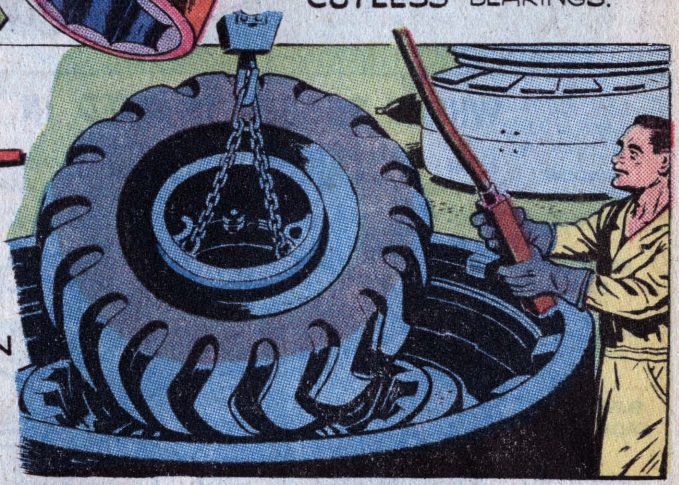


MARINE

WET RUBBER SLIPS, SO B.F. GOODRICH DEVELOPED BEARINGS OF RUBBER FOR THE PROPELLER SHAFTS OF SHIPS OF EVERY SIZE. THEY ARE KNOWN AS "CUTLESS" BEARINGS.

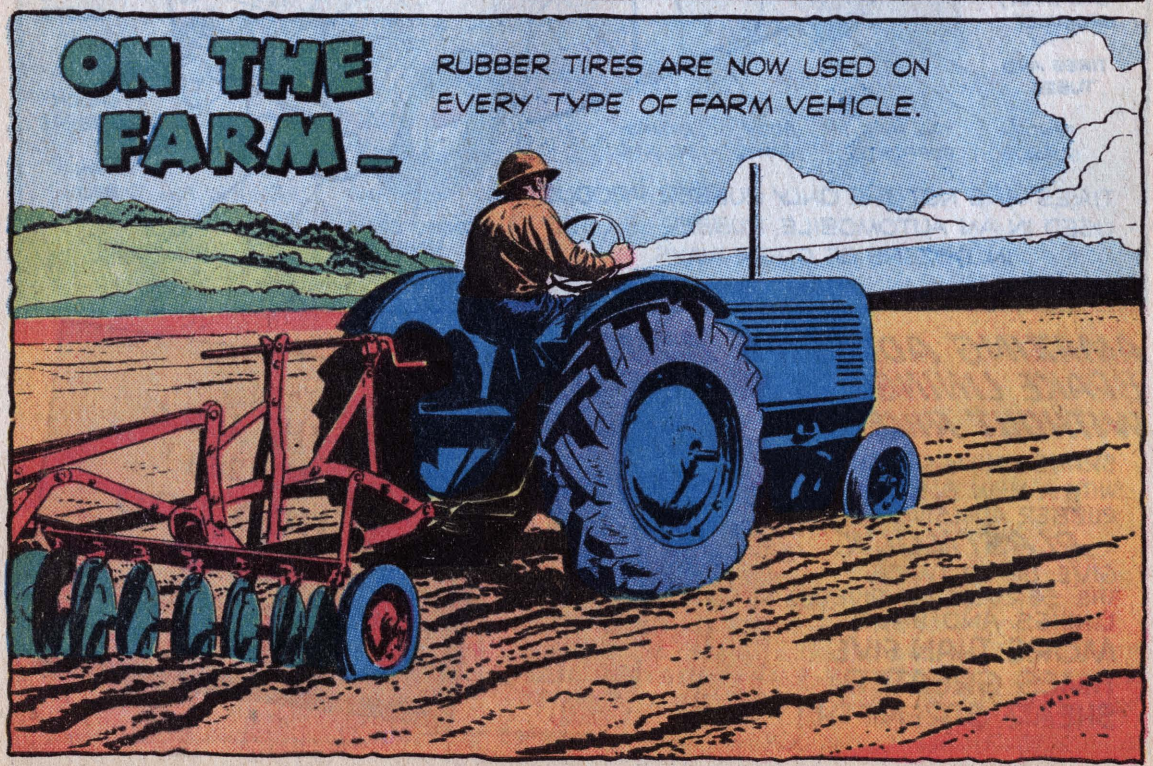
CONSTRUCTION—

GIANT TIRES LIKE THIS (STANDING NEARLY 9 FEET HIGH AND WEIGHING UP TO 3,000 POUNDS) LEAVE THE BFG VULCANIZING MOLD, DESTINED FOR USE ON HEAVY EQUIPMENT NEEDED IN HIGHWAY CONSTRUCTION AND OTHER MAJOR BUILDING PROJECTS.

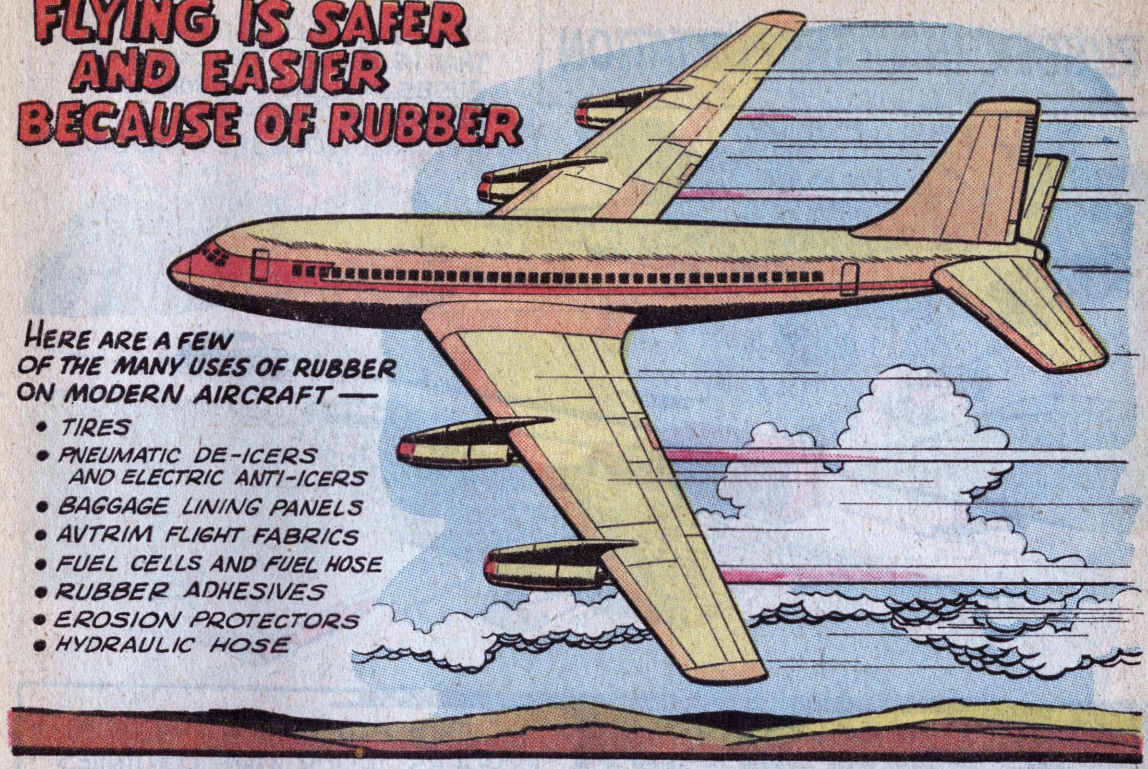


ON THE FARM—

RUBBER TIRES ARE NOW USED ON EVERY TYPE OF FARM VEHICLE.



FLYING IS SAFER AND EASIER BECAUSE OF RUBBER



HERE ARE A FEW OF THE MANY USES OF RUBBER ON MODERN AIRCRAFT —

- TIRES
- PNEUMATIC DE-ICERS AND ELECTRIC ANTI-ICERS
- BAGGAGE LINING PANELS
- AVTRIM FLIGHT FABRICS
- FUEL CELLS AND FUEL HOSE
- RUBBER ADHESIVES
- EROSION PROTECTORS
- HYDRAULIC HOSE

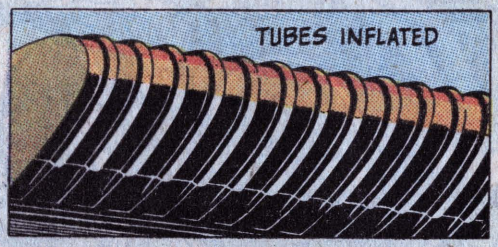
B.F. GOODRICH PNEUMATIC DE-ICER

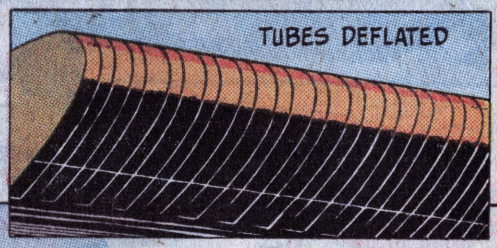
AN IMPORTANT CONTRIBUTION TO FLYING SAFETY IS THE DE-ICER DEVELOPED BY B.F. GOODRICH.

HOW IT WORKS →

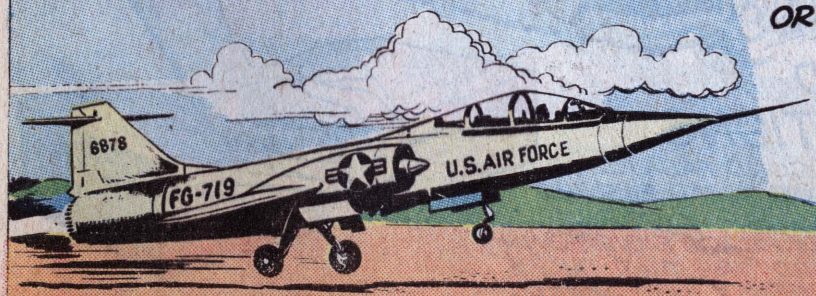
A RUBBER COVER CONTAINING INFLATION TUBES IS ATTACHED TO THE LEADING EDGE OF THE SURFACE TO BE PROTECTED.

THESE TUBES INFLATE AND DEFLATE, CRACKING THE ICE WHICH IS CARRIED AWAY BY THE AIR-STREAM.





TODAY'S TUBELESS AIRCRAFT TIRES LAND JET PLANES SAFELY AT SPEEDS UP TO 250 MILES AN HOUR!

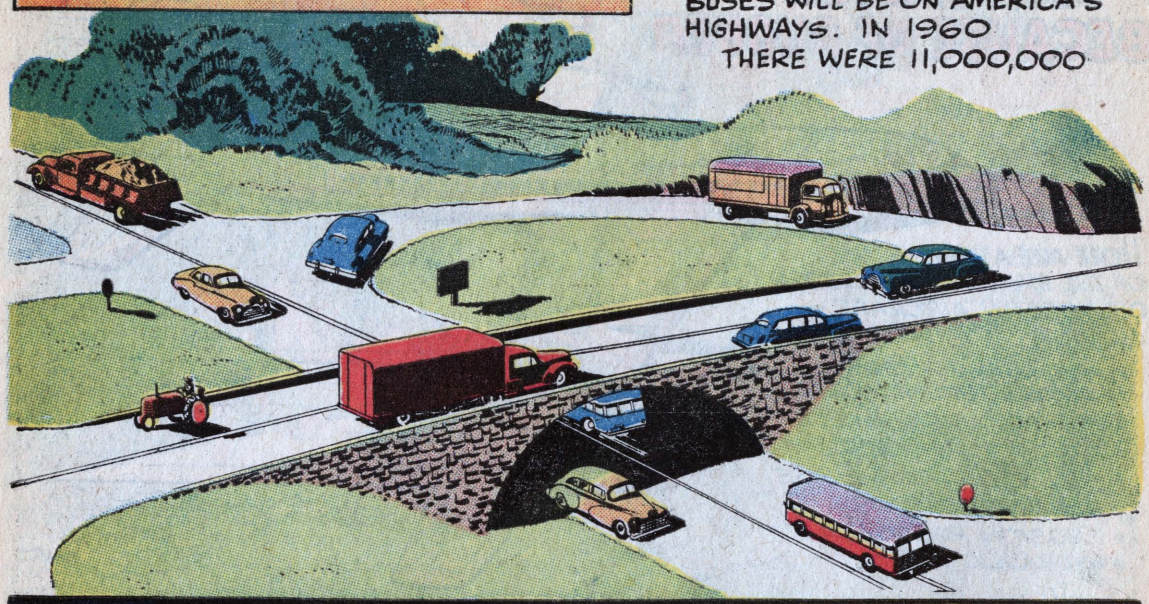


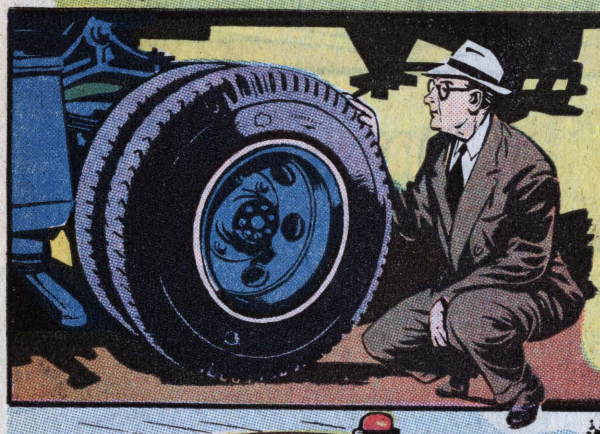
TIRES USED ON WORLD WAR II AIRCRAFT COULD NOT GET TODAY'S FASTER, HEAVIER JET FIGHTERS AND BOMBERS OFF THE GROUND ---- **OR SAFELY LAND THEM!**

B.F. GOODRICH TIRES ALSO LAND PILOTLESS AIRCRAFT (GUIDED MISSILES) **AT SPEEDS UP TO 345 M.P.H.**

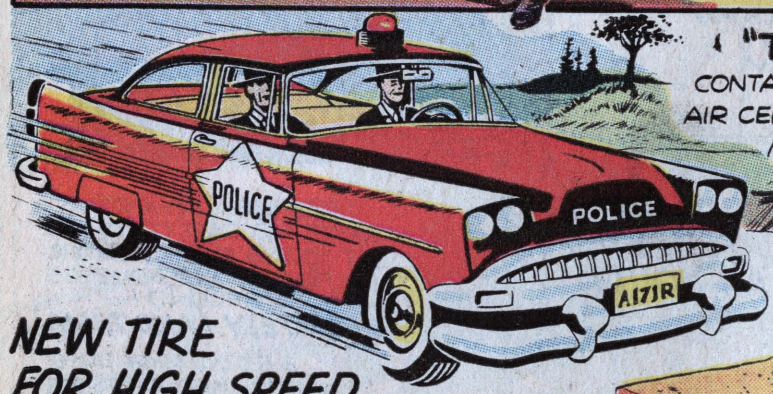
RUBBER IN TRANSPORTATION

BY 1970, IT IS ESTIMATED THAT 16 MILLION TRUCKS AND BUSES WILL BE ON AMERICA'S HIGHWAYS. IN 1960 THERE WERE 11,000,000

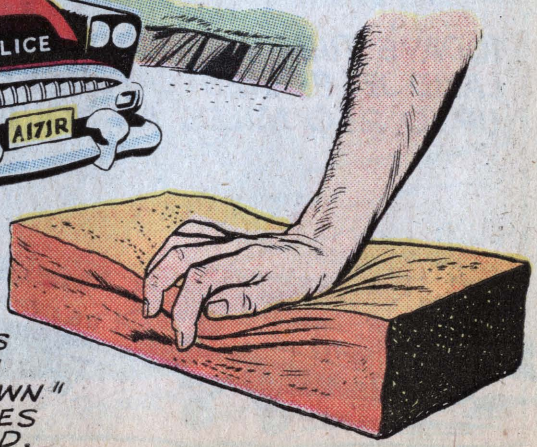




THIS ALL-NYLON TRACTION EXPRESS TRUCK TIRE CONTINUES TO MAKE TRANSPORTATION HISTORY BY DELIVERING OVER 100,000 MILES IN MANY TYPES OF SERVICE. THE BFG TIRE HAS A TREAD THAT GIVES *MORE ORIGINAL MILEAGE THAN A REGULAR TIRE AND RECAP COMBINED!*



"TEXFOAM" SPONGE, CONTAINING MILLIONS OF TINY AIR CELLS, MAKES SEAT CUSHIONS MORE COMFORTABLE.



NEW TIRE FOR HIGH SPEED POLICE OPERATIONS

HUNDREDS OF DIFFERENT CORD FABRICS, TIRE CONSTRUCTIONS AND TREAD RUBBERS WERE TESTED BEFORE B.F. GOODRICH DESIGNED ITS "HIGHWAY PATROL SILVERTOWN" TIRE — A NYLON CORD TIRE THAT TAKES PUNISHMENT OF EMERGENCY HIGH SPEED.

RUBBER FOOTWEAR
OF MANY TYPES
INDUSTRIAL BOOTS
DRESS FOOTWEAR
"P-F" CANVAS SHOES
INSULATED FOOTWEAR
FISHING AND HUNTING BOOTS

RUBBER HELPS INDUSTRY DO UNUSUAL THINGS -

RECORD BREAKING BELT!

100 MILLION TONS OF COBBLE, SAND AND GRAVEL WERE CARRIED BY THIS 4,900-FOOT RUBBER CONVEYOR BELT IN BUILDING THE OROVILLE DAM --- WORLD'S TALLEST EMBANKMENT DAM AT A HEIGHT OF 735 FEET.

MORE THAN ONE MILLION RAILCAR LOADS WERE DUMPED ONTO THE CONVEYOR BELT, BREAKING ALL RECORDS FOR MOVING MATERIAL!

WATERPROOF ZIPPER

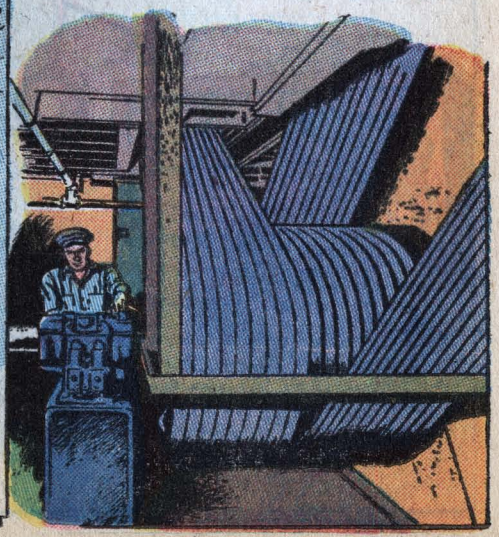
DESIGNED BY B.F. GOODRICH, RUBBER LIPS MAKE ZIPPER WATERTIGHT AND AIRTIGHT.

STATIC CONDUCTING RUBBER BELTS

TO AVOID POSSIBILITY OF EXPLOSION DUE TO STATIC ELECTRICITY IGNITING FLOUR DUST, B. F. GOODRICH DEVELOPED A NEW RUBBER FOR BELTS THAT HAS

ONE BILLION TIMES

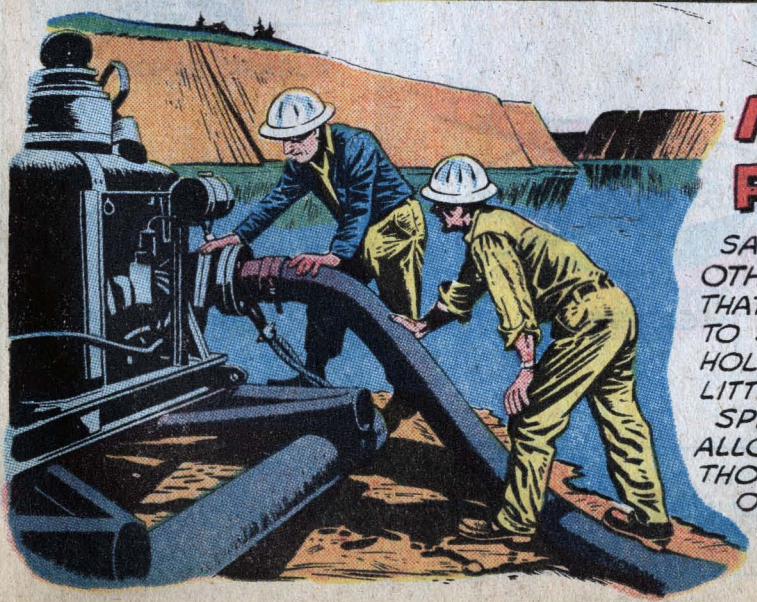
THE ABILITY OF ORDINARY RUBBER TO CARRY ELECTRICITY.



COAL ON A FLYING RUBBER CARPET GOES 4½ MILES FROM MINE TO A BIG ELECTRIC POWERHOUSE IN SOUTHERN OHIO --- OVER 14 HILLS, OVER ROADS AND A RIVER. ONE OF THE LONGEST PERMANENT OUTDOOR CONVEYORS IN THE WORLD, IT HAS CARRIED MILLIONS OF TONS OF COAL.

24 YEARS IN HOT ACID BATH

HAS HAD LITTLE OR NO EFFECT ON THE B.F. GOODRICH TRIFLEX RUBBER LINING WHICH PROTECTS THESE STEEL TANKS FROM THE ATTACK OF CORROSIVE ACID. THE EQUIPMENT "PICKLES" LOW CARBON STEEL ROD AND WIRE



MOVING DAY FOR A LAKE!

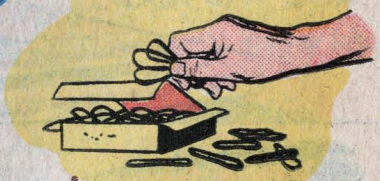
SAND, GRAVEL AND OTHER SHARP PARTICLES THAT CUT ORDINARY RUBBER TO SHREDS -- EVEN WEAR HOLES IN METAL PIPE -- HAD LITTLE EFFECT ON THIS HOSE. SPECIAL RUBBER LINING ALLOWS HOSE TO GULP THOUSANDS OF GALLONS OF WATER-AND-GRIT EVERY DAY

RUBBER IN OUR DAILY LIVES..

RUBBER FLOOR TILE

RUBBER FLOOR MATTING

NURSING NIPPLES



RUBBER BANDS

GARDEN HOSE

GLOVES

FRICTION TAPE

HOT WATER BOTTLES

AND HUNDREDS OF OTHER ITEMS!

Koroseal...

TRADE MARK REG. U.S. PAT. OFF.

MIRACLE SYNTHETIC OF A THOUSAND USES

MADE BY B.F. GOODRICH FROM

COKE.... LIMESTONE..... SALT

A SIGNIFICANT DEVELOPMENT OF B.F. GOODRICH RESEARCH IN RUBBER, *KOROSEAL* CAN BE MADE INTO THE SOFTEST, MOST FLEXIBLE FABRIC OR IT CAN BE MADE AS HARD AS BONE. THOUSANDS OF ITEMS ARE BEING MADE BETTER WITH THIS NEW FLEXIBLE MATERIAL. IT IS NOT AFFECTED BY *AIR, WATER, ACIDS, OIL OR WEATHER.*

SOME EVERYDAY PRODUCTS OF KOROSEAL FLEXIBLE MATERIAL

B.F.Goodrich

FAMOUS FIRSTS

IN RUBBER CHEMISTRY

B. F. GOODRICH, AMERICAN PIONEER IN RUBBER RESEARCH, HAS MADE MANY NOTABLE SCIENTIFIC CONTRIBUTIONS.

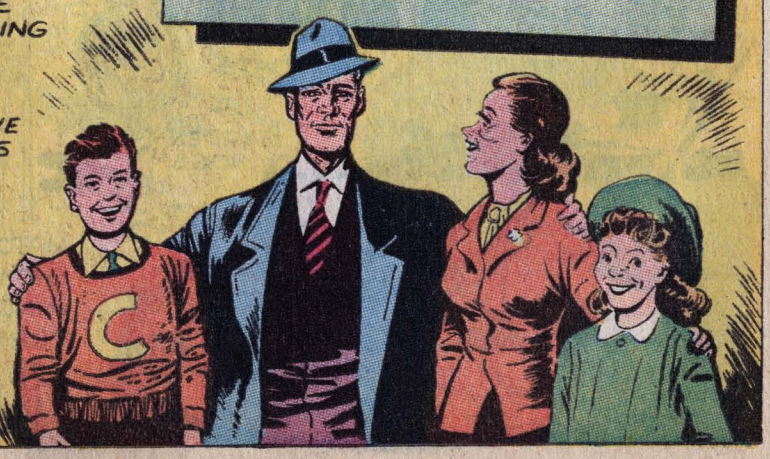
INTRODUCTION OF BFG AGE RESISTORS INTO RUBBER PRODUCTS, FOR EXAMPLE, IS ESTIMATED TO SAVE CONSUMERS AT LEAST **$50,000,000 ANNUALLY.**

THE B. F. GOODRICH CO. WAS FIRST WITH ...

1871—COTTON-COVERED RUBBER FIRE HOSE
1891—AMERICAN PNEUMATIC TIRE
1896—INNER TUBE AND PNEUMATIC TIRE SOLD TO PUBLIC
1899—GOLF BALL WITH WOUND RUBBER-THREAD CENTER
1902—RUBBER SPONGE MADE IN AMERICA
1910—CORD TIRE AND BALLOON TIRE
1920—VULCANIZED GOLF BALL COVERS
1923—SLIDE FASTENERS RUBBER OVERSHOE
1930—AIRPLANE DE-ICER
1932—ENDLESS BAND TRACKS FOR TRACTORS AND MILITARY VEHICLES
1933—COMMERCIAL SELF-SEALING INNER TUBE
1934—STRATOSPHERE SUIT FOR AVIATORS
1940—TIRES OF AMERICAN-MADE RUBBER SOLD TO PUBLIC
1947—PUNCTURE-SEALING TUBELESS TIRE
1948—ZIPPER CONVEYOR BELT
1952—FIRST TUBELESS TIRE FOR AIRPLANES AND FIRST TUBELESS TIRE FOR FARM IMPLEMENTS
1954—REPRODUCTION OF TRUE MOLECULE OF NATURAL RUBBER BY SCIENTISTS OF AMERIPOL, INC.
1955—ANTI-RADS FOR THE PROTECTION OF RUBBER FROM ATOMIC RADIATION
1956—BONDING FILMS, OR CEMENTS, FOR ASSEMBLY OF JET AIRCRAFT
1957—RADIATION-CURED PASSENGER CAR TIRE
1958—DE-ICING SYSTEM FOR LIGHT TWIN ENGINE AIRPLANES
1959—KOROSEAL FLEXIBLE MAGNET
1960—VINYL PLASTIC PIPE FOR HOT WATER PLUMBING
1961—TIRE DESIGNED FOR AIRPLANES THREE TIMES FASTER THAN SOUND
1962—GLASS CORD V-BELT
1964—LARGEST GLASS FILAMENT-WOUND STRUCTURE
1966—FOLDABLE SPARE TIRE, AND RUN-FLAT TIRE
1968—EXTRUDED DUAL HARDNESS PLASTIC SEALS
1968—BERYLLIUM BRAKES FOR AIRCRAFT
1968—NOFOUL RUBBER FOR LONG PROTECTION FROM BARNACLES
1969—TRUSS-TYPE INFLATABLE ESCAPE SLIDE
1969—SMOOTH INFLATABLE FINGERS WHICH CURVE FOR GRASPING OBJECTS
1969—SELF-FOLDING NON-RIGID INFLATABLE JACK

INDUSTRIAL RESEARCH RAISES OUR LIVING STANDARDS

AMERICAN SCIENCE IS CONSTANTLY FINDING NEW AND IMPROVED WAYS TO BETTER AND SAFER LIVING. OUR FREE, COMPETITIVE ECONOMY ENCOURAGES HIGHER STANDARDS OF LIVING BY REWARDING THOSE WHO DISCOVER AND DEVELOP THE PROCESSES, TOOLS AND MATERIALS WHICH CREATE NEW JOBS AND OPPORTUNITIES FOR CONTINUED PROGRESS.



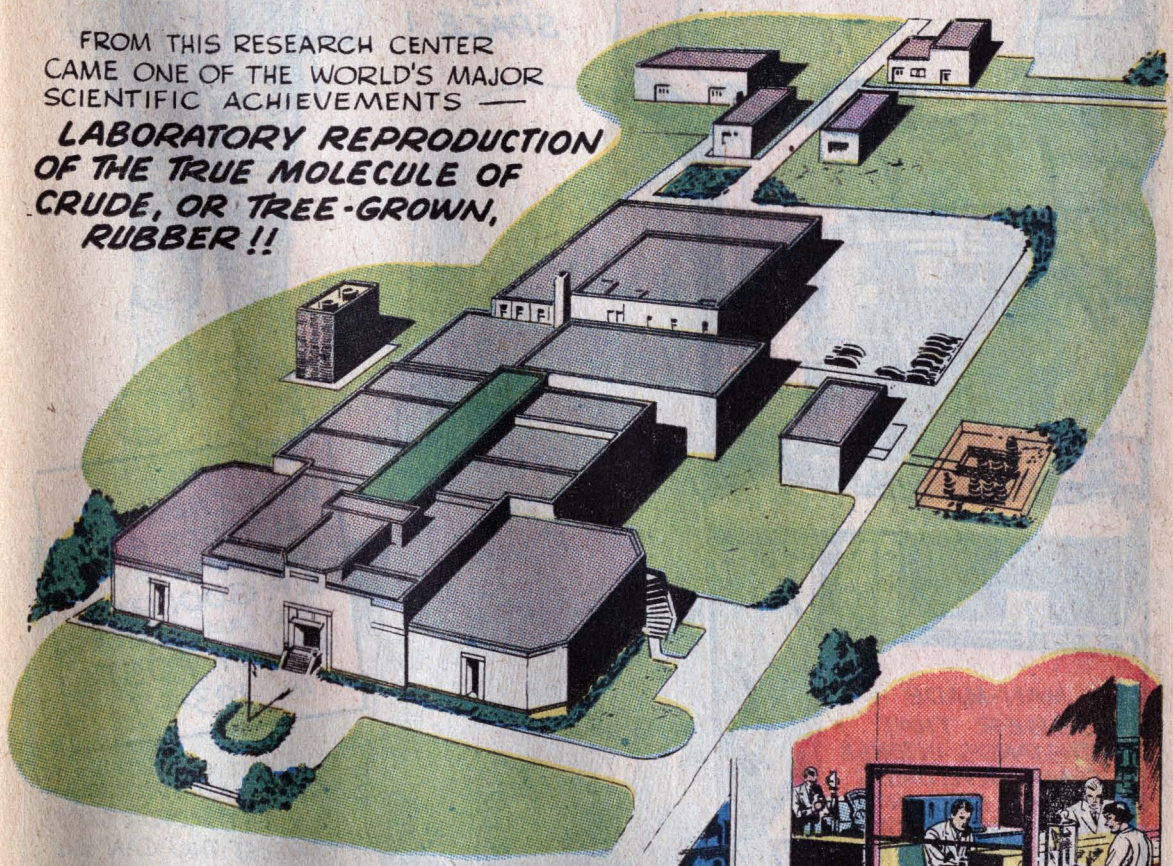
RESEARCH LEADS THE WAY

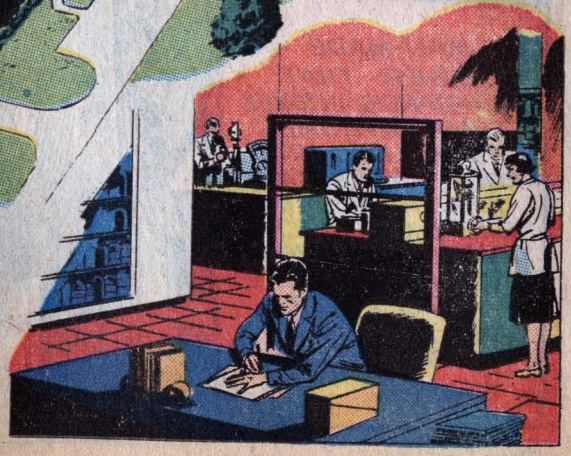
SCIENTIFIC RESEARCH HAS HELPED TO MAKE RUBBER **MORE USEFUL** TO MANKIND IN THOUSANDS OF WAYS.

THIS IS THE MULTI-MILLION DOLLAR **RESEARCH CENTER** AT BRECKSVILLE, OHIO, WHERE B.F. GOODRICH SCIENTISTS HAVE THE MOST MODERN RESEARCH FACILITIES AT THEIR DISPOSAL.

FROM THIS RESEARCH CENTER CAME ONE OF THE WORLD'S MAJOR SCIENTIFIC ACHIEVEMENTS —

LABORATORY REPRODUCTION OF THE TRUE MOLECULE OF CRUDE, OR TREE-GROWN, RUBBER!!

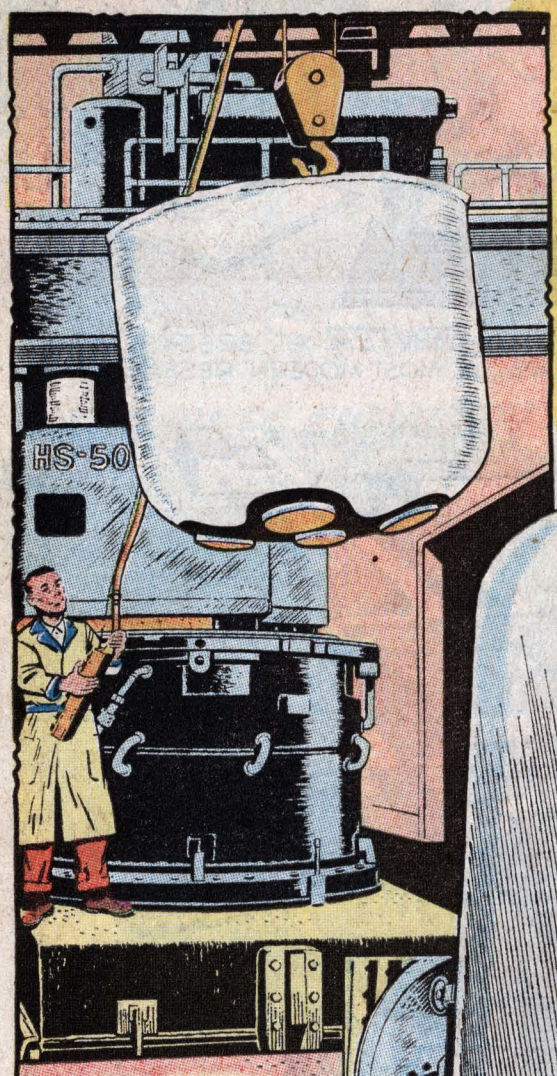




OUR NATION'S GREATEST NEED IN THE YEARS TO COME WILL BE FOR TRAINED SCIENTISTS AND ENGINEERS TO MEET THE REQUIREMENTS OF OUR CREATIVE AGE.

IF YOU ASPIRE TO A SCIENTIFIC CAREER, PREPARE FOR IT IN HIGH SCHOOL. TAKE SUBJECTS THAT WILL QUALIFY YOU FOR SCIENCE COURSES IN COLLEGE!

RUBBER ANSWERS THE CHALLENGE OF SPACE!

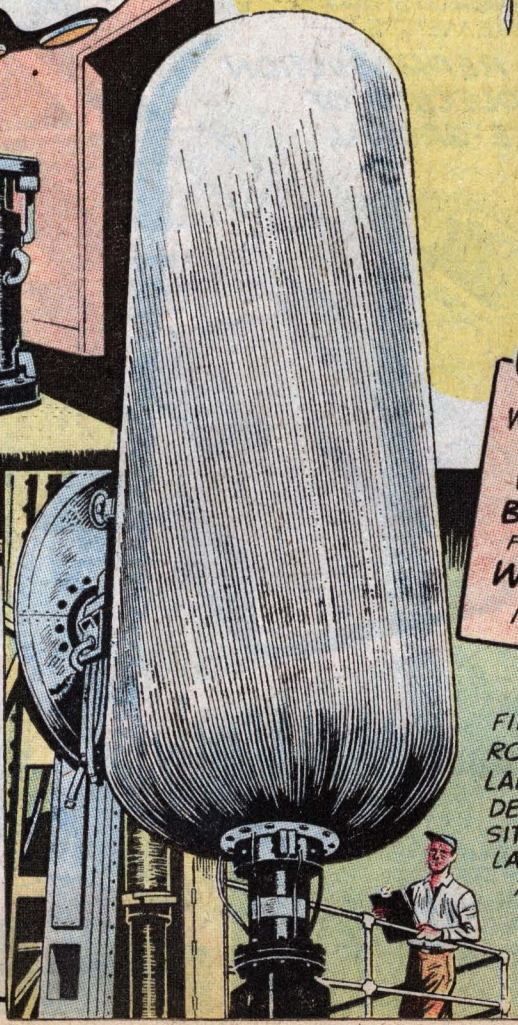


ASTRONAUT SUIT

B.F. GOODRICH IS PROUD TO HAVE DEVELOPED THE SUIT USED BY PROJECT MERCURY ASTRONAUTS FOR OUR NATION'S ENTRY INTO SPACE!

THE WORLD'S FIRST HIGH ALTITUDE SUIT WAS MADE BY B.F. GOODRICH FOR FAMED PILOT WILEY POST IN 1934!

MAN-MADE RUBBER THAT WITHSTANDS INTENSE TEMPERATURES IS MOLDED INTO ROCKET MOTOR CASE INSULATORS IN THIS 5,000-TON HYDRAULIC PRESS AT B.F. GOODRICH'S AEROSPACE AND DEFENSE PRODUCTS.



GIANT GLASS FILAMENT-WOUND ROCKET MOTOR CASES, LARGEST THAT CAN BE DELIVERED TO LAUNCH SITES BY CONVENTIONAL LAND TRANSPORTATION, ARE PRODUCED ON THIS WINDING MACHINE AT B.F. GOODRICH.

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